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Research Report HLDI A-11
June 1979

Automobile Insurance Losses
Collision Coverages

THE CONSISTENCY OF THE LOSS EXPERIENCE OF SPECIFIC VEHICLES PRODUCED IN SEVERAL YEARS

1975 To 1978 Models

Highway
Loss
Data
Institute

Watergate 600, Washington, D.C.

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Collision Coverages

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Highway Loss Data Institute
Watergate Six Hundred
Washington, D.C. 20037

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Summary

This report documents the model year-to-model year consistency of the collision coverage loss experience results of specific compact and subcompact cars produced in each of several recent model years. Intermediate and full-size cars were not included in this report because of the many fundamental changes in such cars during the same years.

Principal Findings:

- The collision loss experience of most specific cars remained consistently better, worse, or close to average regardless of the model year in which they were produced.

- Among both compacts and subcompacts, the relative rankings of cars in the same car size group, based on average loss payment per insured vehicle year, were essentially the same in each successive model year. The data show that if a car ranks better than another in its collision loss experience in one model year, most likely it will rank better in other model years.

- In each model year, individual four-door models generally had lower average loss payments per insured vehicle year, and hence ranked better, than the corresponding two-door model of the same kinds of vehicles.

- The relative claim frequencies and average loss payments per claim for individual cars were less variable across model years than the relative average loss payments per insured vehicle year.

It is intended that the dissemination of this and other HLDI reports will contribute to research into ways for reducing highway damage to people and their property, and also provide the public with information relating to the differences in the crash damage produced by different kinds of vehicles.

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Introduction

The Highway Loss Data Institute (HLDI) is a non-profit, public service organization that gathers, processes, and publishes insurance data concerned with human and economic losses associated with motor vehicle use, and, especially, with the ways such losses vary among different kinds of vehicles.

Beginning with the 1972 model year, HLDI has been reporting the collision coverage loss experience – claim frequency, average loss payment per claim, and average loss payment per insured vehicle year – of private passenger cars. A series of reports has described the substantial variations in loss experience by model year, make and series, car size group, and body style subgroup. Within each model year, these reports have shown significant consistency in the rankings of makes and series as they age. This report considers the consistency across model years of the loss experience of specific cars produced in each of several recent model years.

The individual collision coverage results used have been reported in a number of previous HLDI reports, and are based on data supplied by eight insurers: Aetna Life and Casualty, Allstate, Kemper, Liberty Mutual, Nationwide, Prudential, State Farm, and Travelers. A description of the sources and nature of the data is presented in Appendix B. The data analysis methods used to determine the collision loss results are discussed in Appendix C. Definitions are given in Appendix D.

Results and Discussion

Table 1 summarizes the relative average loss payment per insured vehicle year results for 30 individual series from model years 1975 to 1978. The results for each vehicle series are presented in relative terms, with 100 corresponding to the overall results for each model year. The results are for 1978 models during their first year, 1977 models during their first two years, and 1975 and 1976 models during their first three years of availability. The mean and standard deviation of the results for each car across the model years are also given in Table 1.

The vehicle series in the table are limited to those in the subcompact and compact car size groups. Results for series in the intermediate and full-size car size groups are not presented because the characteristics of the cars in these size groups changed greatly in the 1975 to 1978 model year period. In illustration, in the 1977 model year, General Motors (GM) redesigned and reduced the wheelbases of all of its previous full-size series cars, except Cadillacs and the Oldsmobile Toronado, changing them to intermediate-sized vehicles; in the 1978 model year, GM reduced the wheelbases of the Chevrolet Malibu, Buick Century, Oldsmobile Cutlass, and Pontiac Le Mans from the intermediate to the compact size category. As a consequence, few vehicle series in the intermediate and full-size car groups remained comparable across the four model years. In contrast, many 1975 to 1978 model year subcompact and compact vehicle series underwent no major design changes, and results for these series are comparable across the four model years. Moreover, many of these series have also been produced in the current, 1979 model year.

The vehicle series in Table 1 include 14 subcompact and 16 compact models from 11 makes, and are listed in ascending sequence of the averages of their relative results across the four model years within four body style subgroups – regular two-door models, regular four-door models, station wagons, and sports or specialty models. The series listed had the greatest exposure in the four model years among the series in the two car size groups. Except for the Ford Maverick and Mustang II, all the series have been produced in the 1979 model year. In the table, no regular four-door models are listed among the subcompact series and no station wagons among the compact series because these models had substantially less exposure in the four model years than the models listed. Only one station wagon (the Ford Pinto) and one sports model (the Chevrolet Corvette) had sufficient exposure in the four model years among the subcompact series for inclusion in the table. The table includes results for both the two-door and four-door models of six different compact series.

Relative claim frequency and average loss payment per claim results corresponding to those in Table 1 are given in Appendix A.

Comparison of Relative Results Across Model Years

It is seen in Table 1, Parts B and C, that the relative average loss payment per insured vehicle year results for individual cars varied considerably across model years. The standard deviation for a car is an index of the variation across model years. The standard deviations for the 30 cars ranged from 2.1 to 17.3 with a median of 7.9. (The relative claim frequency and average loss payment per claim results for individual cars in Appendix A were less variable; the median of the standard deviations was 4.8 for the claim frequencies, and 5.7 for the averages.)

The variations in results across model year, however, were sufficiently small in magnitude so that individual vehicle series generally maintained their position above or below the average in each model year. This consistency is evident in Figures 1 and 2, which graphically depict the results in Table 1. It is seen that results for each car tended to be well below, well above, or close to 100 in each model year.

Comparison of Ranked Results Across Model Years

Table 2 shows the rank-orderings of the 10 subcompact and of the 10 compact cars that had results in Table 1 for each of the four model years. For each model year, rank 1 was assigned to the car in each size group with the lowest average loss payment per insured vehicle year, rank 2 was assigned to the next lowest, and so on; in the case of ties, the average rank was assigned. The cars are listed in ascending sequence of the averages of their relative results across the four model years, shown in Table 1. As can be seen by inspection, there is considerable consistency in the rankings of the individual car series from year to year.

Considered more formally, the quantity W given in Table 2 is Kendall's coefficient of concordance, and, as applied to these data, is a measure of the consistency of the relative rankings of the cars in a size group across model years. When Kendall's coefficient is close to 1, as is the case here for both the subcompacts (0.94) and the compacts (0.92), it shows that there is a high degree of consistency among the rankings. (When Kendall's coefficient is close to 0, which is *not* the case here, it shows little consistency in the rankings of the data from which it is derived.) See Appendix C for computational details and citation.

Table 2, Part B also shows that in each model year the four-door model of a series nearly always ranked higher than the two-door model. The only exceptions were the Mercury Monarch in the 1976 and 1978 model years and the Oldsmobile Omega in the 1977 model year when there was a tie between the two-door and four-door models.

Average loss payments per insured vehicle year for individual cars in different model years are affected by changes in various factors. These include changes in their manufacturers' replacement parts pricing policies, in the driving environment, and in labor costs. The high degree of consistency across model years of the relative rankings of cars in the same car size group indicates, however, that the *rank-orderings* of the average loss payments per insured vehicle year — as distinguished from their absolute magnitudes — are, to a considerable extent, insensitive to changes in these factors. Thus, if a car ranks better than another in its collision loss experience in one model year, most likely it will rank better in other model years as well.

TABLE 1

RELATIVE AVERAGE LOSS PAYMENT PER INSURED VEHICLE YEAR BY MAKE AND SERIES – 1975 TO 1978 MODEL YEARS*

PART A: ALL CARS

MAKE & SERIES	MODEL YEAR			
	1975	1976	1977	1978
All All	100 = $65	100 = $70	100 = $83	100 = $93

*All results are standardized; see Appendix C.

TABLE 1

RELATIVE AVERAGE LOSS PAYMENT PER INSURED VEHICLE YEAR BY MAKE AND SERIES – 1975 TO 1978 MODEL YEARS*

PART B: SUBCOMPACT CARS (WHEELBASE ≤101 IN.)

MAKE & SERIES		MODEL YEAR 1975	1976	1977	1978	MEAN	STANDARD DEVIATION
Regular Two-Door Models							
Chevrolet	Chevette	–	80	77	86	81.0	4.6
American	Pacer	97	90	98	–	95.0	4.4
Honda	Civic	74	111	110	96	97.8	17.3
Ford	Pinto	99	104	104	95	100.5	4.4
Pontiac	Sunbird	–	109	105	108	107.3	2.1
Dodge	Colt	117	113	110	109	112.3	3.6
Volkswagen	Rabbit**	124	124	116	111	118.8	6.4
Chevrolet	Monza	133	113	133	128	126.8	9.5
Ford	Mustang II	133	134	118	123	127.0	7.8
Plymouth	Arrow	–	127	133	153	137.7	13.6
Buick	Skyhawk	146	141	118	149	138.5	14.1
Oldsmobile	Starfire	148	141	134	134	139.3	6.7
Station Wagons							
Ford	Pinto	88	90	98	74	87.5	10.0
Sports							
Chevrolet	Corvette	270	269	269	237	261.3	16.2

*All results are standardized; see Appendix C.

**Body style cannot be determined from the Vehicle Identification Number.

TABLE 1

RELATIVE AVERAGE LOSS PAYMENT PER INSURED VEHICLE YEAR BY MAKE AND SERIES – 1975 TO 1978 MODEL YEARS*

PART C: COMPACT CARS (101 IN. < WHEELBASE ≤ 111 IN.)

MAKE & SERIES		MODEL YEAR 1975	1976	1977	1978	MEAN	STANDARD DEVIATION
Regular Two-Door Models							
Buick	Skylark	–	71	64	63	66.0	4.4
Chevrolet	Nova	76	80	77	62	73.8	8.0
Oldsmobile	Omega	89	77	77	76	79.8	6.2
Dodge	Aspen	–	94	92	69	85.0	13.9
Plymouth	Volare	–	94	88	81	87.7	6.5
Mercury	Monarch	104	104	100	69	94.3	16.9
Ford	Maverick	108	101	84	–	97.7	12.3
Ford	Granada	112	106	96	90	101.0	9.9
Regular Four-Door Models							
Buick	Skylark	–	66	58	52	58.7	7.0
Chevrolet	Nova	70	73	69	53	66.3	9.0
Oldsmobile	Omega	75	76	77	45	68.3	15.5
Ford	Maverick	91	84	76	–	83.7	7.5
Ford	Granada	99	96	89	83	91.8	7.2
Mercury	Monarch	101	110	89	76	94.0	14.8
Specialty							
Chevrolet	Camaro	132	133	142	129	134.0	5.6
Pontiac	Firebird	169	189	175	183	179.0	8.8

*All results are standardized; see Appendix C.

Figure 1
Collision coverage loss experience
relative average loss payments per insured vehicle year
subcompact models—1975 to 1978 model years

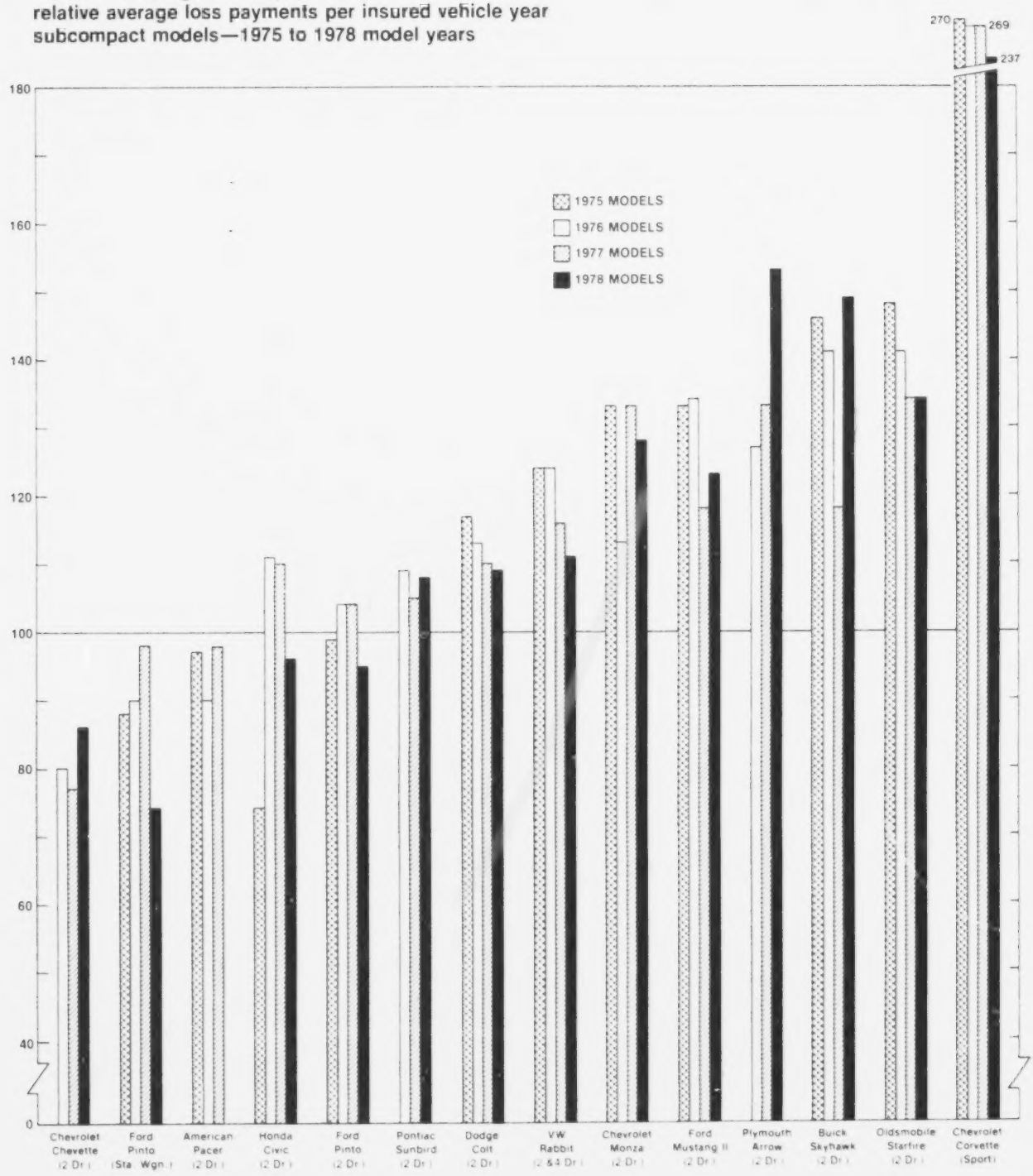

Figure 2
Collision coverage loss experience
relative average loss payments per insured vehicle year
compact models—1975 to 1978 model years

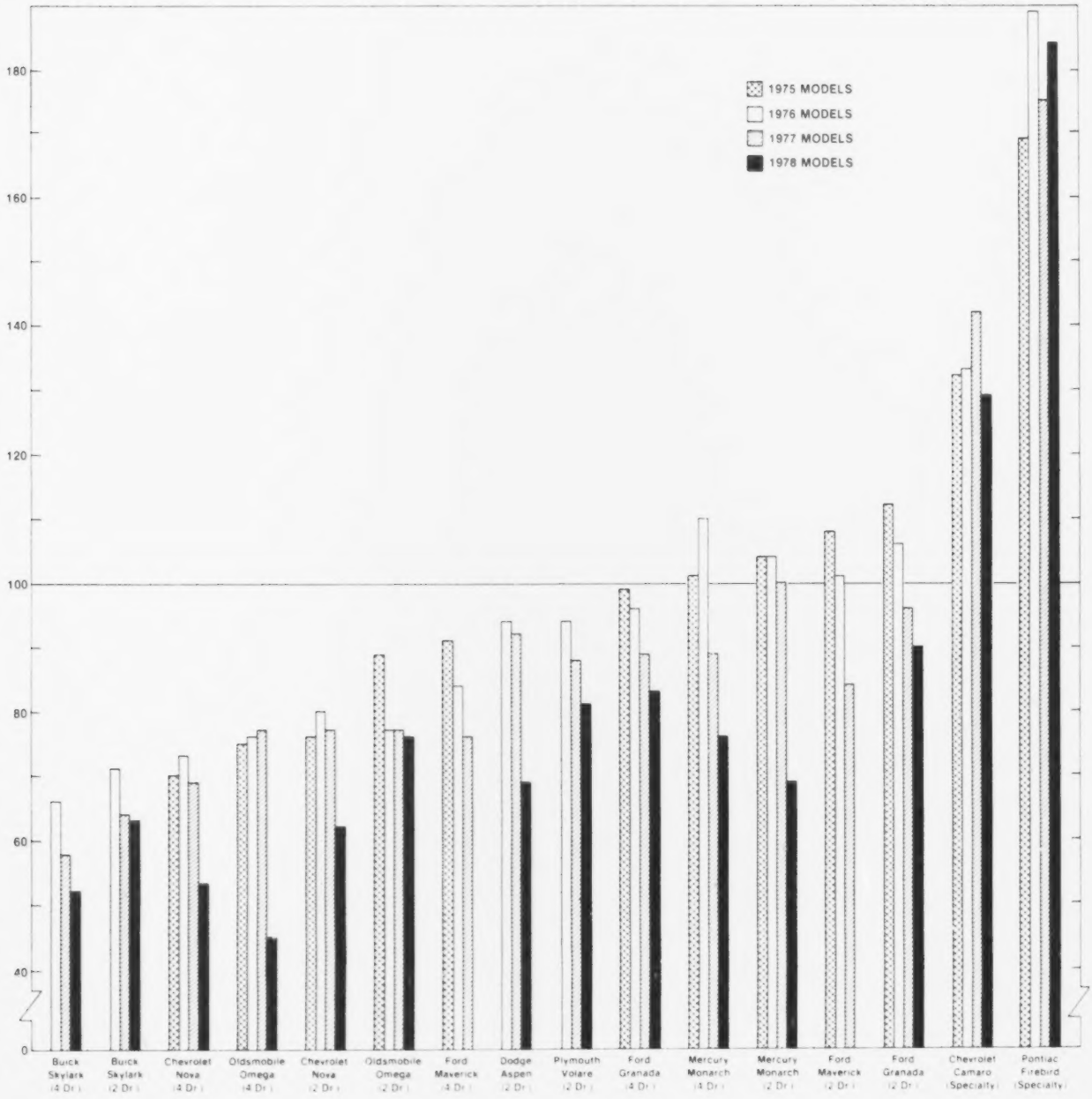

TABLE 2

RANK-ORDERED AVERAGE LOSS PAYMENTS PER INSURED VEHICLE YEAR BY MAKE AND SERIES – 1975 TO 1978 MODEL YEARS

PART A: SUBCOMPACT CARS (WHEELBASE ≤ 101 IN.)

MAKE	SERIES	BODY STYLE	MODEL YEAR RANKING*			
			1975	1976	1977	1978
Ford	Pinto	StationWagon	2	1	1	1
Honda	Civic	2-Door	1	3	3.5	3
Ford	Pinto	2-Door	3	2	2	2
Dodge	Colt	2-Door	4	4.5	3.5	4
Volkswagen	Rabbit	– – †	5	6	5	5
Chevrolet	Monza	2-Door	6.5	4.5	8	7
Ford	Mustang II	2-Door	6.5	7	6.5	6
Buick	Skyhawk	2-Door	8	8.5	6.5	9
Oldsmobile	Starfire	2-Door	9	8.5	9	8
Chevrolet	Corvette	Sport	10	10	10	10
			W = 0.94			

*Average rank assigned to tied values.
†Body style cannot be determined from the Vehicle Identification Number.

PART B: COMPACT CARS (101 IN. < WHEELBASE ≤ 111 IN.)

MAKE	SERIES	BODY STYLE	MODEL YEAR RANKING*			
			1975	1976	1977	1978
Chevrolet	Nova	4-Door	1	1	1	2
Oldsmobile	Omega	4-Door	2	2	3	1
Chevrolet	Nova	2-Door	3	4	3	3
Oldsmobile	Omega	2-Door	4	3	3	5.5
Ford	Granada	4-Door	5	5	5.5	7
Mercury	Monarch	4-Door	6	8	5.5	5.5
Mercury	Monarch	2-Door	7	6	8	4
Ford	Granada	2-Door	8	7	7	8
Chevrolet	Camaro	Specialty	9	9	9	9
Pontiac	Firebird	Specialty	10	10	10	10
			W = 0.92			

*Average rank assigned to tied values.

Appendix A

Relative Claim Frequency and Average Loss Payment Per Claim Results by Make and Series — 1975 to 1978 Model Years

TABLE A1

RELATIVE CLAIM FREQUENCY PER 100 INSURED VEHICLE YEARS BY MAKE AND SERIES – 1975 TO 1978 MODEL YEARS*

PART A: ALL CARS

MAKE & SERIES	MODEL YEAR			
	1975	1976	1977	1978
All All	100 = 10.0	100 = 10.1	100 = 10.9	100 = 10.9

*All results are standardized; see Appendix C.

TABLE A1

RELATIVE CLAIM FREQUENCY PER 100 INSURED VEHICLE YEARS BY MAKE AND SERIES – 1975 TO 1978 MODEL YEARS*

PART B: SUBCOMPACT CARS (WHEELBASE ≤101 IN.)

MAKE & SERIES		MODEL YEAR 1975	1976	1977	1978	MEAN	STANDARD DEVIATION
Regular Two-Door Models							
Chevrolet	Chevette	–	78	82	84	81.3	3.1
American	Pacer	99	93	100	–	97.3	3.8
Honda	Civic	75	107	101	105	97.0	14.9
Ford	Pinto	98	101	102	105	101.5	2.9
Pontiac	Sunbird	–	110	104	111	108.3	3.8
Dodge	Colt	109	111	110	115	111.3	2.6
Volkswagen	Rabbit**	107	110	106	107	107.5	1.7
Chevrolet	Monza	120	110	115	112	114.3	4.3
Ford	Mustang II	114	117	109	119	114.8	4.3
Plymouth	Arrow	–	129	128	147	101.7	2.5
Buick	Skyhawk	121	120	112	106	114.8	7.1
Oldsmobile	Starfire	124	119	117	126	121.5	4.2
Station Wagons							
Ford	Pinto	87	89	99	87	90.5	5.7
Sports							
Chevrolet	Corvette	135	133	121	98	121.8	17.0

*All results are standardized; see Appendix C.

**Body style cannot be determined from the Vehicle Identification Number.

TABLE A1

RELATIVE CLAIM FREQUENCY PER 100 INSURED VEHICLE YEARS BY MAKE AND SERIES – 1975 TO 1978 MODEL YEARS*

PART C: COMPACT CARS (101 IN. < WHEELBASE ≤ 111 IN.)

MAKE & SERIES		MODEL YEAR				MEAN	STANDARD DEVIATION
		1975	1976	1977	1978		
Regular Two-Door Models							
Buick	Skylark	–	77	76	83	78.7	3.8
Chevrolet	Nova	83	88	84	76	82.8	5.0
Oldsmobile	Omega	93	86	93	83	88.1	5.1
Dodge	Aspen	–	98	96	91	95.0	3.6
Plymouth	Volare	–	92	92	83	89.0	5.2
Mercury	Monarch	102	103	104	83	98.0	10.0
Ford	Maverick	101	100	85	–	95.3	9.0
Ford	Granada	101	100	94	86	95.3	6.9
Regular Four-Door Models							
Buick	Skylark	–	76	74	64	71.3	6.4
Chevrolet	Nova	79	81	80	82	80.5	1.3
Oldsmobile	Omega	86	82	85	63	79.0	10.8
Ford	Maverick	92	87	83	–	87.3	4.5
Ford	Granada	95	89	89	84	89.3	4.5
Mercury	Monarch	97	99	87	88	92.8	6.1
Specialty							
Chevrolet	Camaro	131	132	143	138	136.0	5.6
Pontiac	Firebird	158	172	151	154	158.8	9.3

*All results are standardized; see Appendix C.

TABLE A2

RELATIVE AVERAGE LOSS PAYMENT PER CLAIM BY MAKE AND SERIES – 1975 TO 1978 MODEL YEARS*

PART A: ALL CARS

MAKE & SERIES	MODEL YEAR			
	1975	1976	1977	1978
All All	100 = $648	100 = $695	100 = $766	100 = $854

*All results are standardized; see Appendix C.

TABLE A2

RELATIVE AVERAGE LOSS PAYMENT PER CLAIM BY MAKE AND SERIES – 1975 TO 1978 MODEL YEARS*

PART B: SUBCOMPACT CARS (WHEELBASE ≤ 101 IN.)

MAKE & SERIES		MODEL YEAR				MEAN	STANDARD DEVIATION
		1975	1976	1977	1978		
Regular Two-Door Models							
Chevrolet	Chevette	–	102	94	102	99.3	4.6
American	Pacer	98	96	97	–	97.0	1.0
Honda	Civic	98	104	107	91	100.0	7.1
Ford	Pinto	101	103	102	90	99.0	6.1
Pontiac	Sunbird	–	98	101	97	98.7	2.1
Dodge	Colt	107	101	99	94	100.3	5.4
Volkswagen	Rabbit**	116	113	108	103	110.0	5.7
Chevrolet	Monza	111	102	114	114	110.3	5.7
Ford	Mustang II	117	114	107	103	110.3	6.4
Plymouth	Arrow	–	99	102	104	101.7	2.5
Buick	Skyhawk	121	118	105	140	121.0	14.4
Oldsmobile	Starfire	119	119	113	107	114.5	5.7
Station Wagons							
Ford	Pinto	101	100	98	85	96.0	7.4
Sports							
Chevrolet	Corvette	200	202	220	241	215.8	19.1

*All results are standardized; see Appendix C.

**Body style cannot be determined from the Vehicle Identification Number.

TABLE A2

RELATIVE AVERAGE LOSS PAYMENT PER CLAIM BY MAKE AND SERIES – 1975 TO 1978 MODEL YEARS*

PART C: COMPACT CARS (101 IN. < WHEELBASE ≤ 111 IN.)

MAKE & SERIES		MODEL YEAR 1975	1976	1977	1978	MEAN	STANDARD DEVIATION
Regular Two-Door Models							
Buick	Skylark	–	92	83	76	83.7	8.0
Chevrolet	Nova	91	90	91	82	88.5	4.4
Oldsmobile	Omega	96	89	82	91	89.5	5.8
Dodge	Aspen	–	96	95	76	89.0	11.3
Plymouth	Volare	–	102	95	98	98.3	3.5
Mercury	Monarch	102	101	95	83	95.3	8.7
Ford	Maverick	107	101	99	–	102.3	4.2
Ford	Granada	111	106	101	104	105.5	4.2
Regular Four-Door Models							
Buick	Skylark	–	86	77	81	81.3	4.5
Chevrolet	Nova	88	89	85	65	81.8	11.3
Oldsmobile	Omega	87	93	90	72	85.5	9.3
Ford	Maverick	99	96	91	–	95.3	4.0
Ford	Granada	104	107	100	98	102.3	4.0
Mercury	Monarch	104	110	101	87	100.5	9.7
Specialty							
Chevrolet	Camaro	101	100	99	94	98.5	3.1
Pontiac	Firebird	107	109	114	119	112.3	5.4

*All results are standardized; see Appendix C.

Appendix B

Sources and Nature of Data

Sources and Nature of Data

The results in this report appeared in previous HLDI reports. The 1976, 1977, and 1978 model year results are from HLDI Research Report R78-2 and the 1975 model results are from R77-2. All results for individual vehicle series contained in these reports were based on at least 1,000 insured vehicle years of exposure. Data used in this study were supplied by eight insurers: Aetna Life and Casualty, Allstate, Kemper, Liberty Mutual, Nationwide, Prudential, State Farm, and Travelers. "Assigned risk," fleet policies, and all data from Massachusetts were excluded. Only payments for damage to insured automobiles were included; monies recovered from the salvage of wrecked vehicles were excluded, as were monies subsequently recovered by the companies through subrogation actions.

Insurance Policy Data

Insurance policy data, as distinct from claim data, describe the characteristics on an insured vehicle, including its make and series and the nature of its collision coverage. Policy data used in this report included the following basic information:

- Vehicle Identification Number (VIN)*
- Deductible Amount*
- Rated Driver Characteristics*
- Date and Nature of Relevant Changes in Coverage

Insurance Claim Data

Insurance claim data report the characteristics of an insured vehicle for which a collision coverage claim is made, the inititation of the claim, and/or the corresponding payment. Claim data used in this report included the following basic information:

- Vehicle Identification Number (VIN)
- Crash Date
- Loss Payment Amount

The dollar amounts reported represented loss payments made to or on behalf of the policyholder for damage to the insured vehicle.

*See Appendix D for definitions.

Appendix C

Method of Data Analysis

Method of Data Analysis

Vehicle Description and Identification

The Vehicle Identification Numbers (VINs) of most new automobiles sold in the United States are individually unique numbers that contain, in coded form, detailed information as to each vehicle's make, series, and other distinguishing characteristics.

The very specific vehicle types for which results are presented in this report were derived from the VINs of the individual automobiles.

Only data with valid VINs were used for this report. Each VIN was decoded into a set of specific vehicle characteristics. For the purposes of this report the vehicle characteristics of primary concern were make, series, and vehicle size class (Appendix D). The use of VINs also permits analyses of other very specific vehicle characteristics, such as horsepower, body style, etc.

Exposure

Exposure, in insured vehicle years, was computed for each individual vehicle from the coverage data. The total number of insured vehicle years for each vehicle series was then obtained by accumulating the exposure for all of the individual vehicles of that vehicle series.

The exposure for each vehicle series was obtained for each of the four most common combinations of deductible amount and operator age group, a, b, c, d, shown below:

Deductible Amount	Youthful Operator*	No Youthful Operator*
$ 50	a	b
$100	c	d

Claim Frequency

Both pending and paid claims for an individual vehicle were first matched with its corresponding coverage data to ensure that the crash had occurred within an appropriate period of collision coverage for that vehicle. In every instance in which multiple claims were made for the same crash, they were treated as a single claim in the calculations of claim frequency. Claims that were settled without payment, as well as those paid even though the damage was less than the deductible amount, were excluded from the computations. All remaining claims for each vehicle series were used, together with the corresponding exposure, to compute the claim frequency: the number of claims per 100 insured vehicle years.

For each vehicle series, claim frequencies were computed for each of the four combinations of deductible and operator age group, a, b, c, d, shown above.

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*See Appendix D for definitions.

Average Loss Payment

Paid claims for each vehicle series were used to compute its average loss payment per claim. They were summed and divided by the number of claims to produce the average loss payment per claim. Claims that were settled without payment, as well as those paid even though the damage was less than the deductible amount, were excluded from the computations. In every instance in which multiple claims and/or multiple payments were made for the same crash, they were treated as a single claim and/or a single payment in the calculation of average loss payment.

Average loss payments were also obtained for each combination of the two principal deductible amounts and the two operator age groups.

Average Loss Payment per Insured Vehicle Year

The average loss payment per insured vehicle year for each vehicle series was obtained by multiplying the claim frequency per 100 insured vehicle years by the average loss payment, and dividing the result by one hundred.

Average loss payments per insured vehicle year were also obtained for each combination of deductible amount and operator age group.

Standardization

It is well known that loss experience can vary substantially in relation to certain non-vehicle factors. Two important such factors are the deductible amount of the coverage and the operator age group; both claim frequency and average loss payment vary with these factors. In the case of the operator age group, youthful operators generally generate higher insurance losses than older drivers. Thus, if compared vehicles have different proportions of youthful operators, this difference, if not taken into consideration, would be sufficient to bias the comparison. Results obtained from the two deductible categories, $50 and $100, also vary. For example, $50 deductible claim frequencies are higher than $100 deductible claim frequencies. Again, if compared vehicles have different proportions of $50 deductible coverages, this difference, if not taken into consideration, would also be sufficient to bias the comparison.

In order to remove any biases in the comparison of results that could arise because of differences attributable to variations among different vehicles in deductible amount and operator age group, results were first adjusted or standardized so as to equalize the effects of the two non-vehicle factors in the standardized results. In this procedure, applied to both claim frequency and average loss payments, a weighted average of the actual results for each combination of deductible amount and operator age group was computed using the standardization weights shown in the table. Since the same weights were always used, the effects due to the non-vehicle factors were present in equal amounts in the standardized results. Therefore, to the extent that the age distributions within each operator age group do not vary substantially for different vehicles, these effects can no longer bias comparisons of results.

The standardization procedure employed is widely used in vital health statistics.* The basic principle of the method is the introduction of a selected population with a *standard* distribution across the combinations of deductible amount and operator age group as represented by the standardization weights in the table.

---

*For example, see Armitage, P., *Statistical Methods in Medical Research*, Wiley, New York, 1971.

STANDARDIZATION WEIGHTS

Deductible Amount	Operator Age Group		
	Youthful Operator	No Youthful Operator	Combined
$ 50	0.05	0.35	0.40
$100	0.15	0.45	0.60
Combined	0.20	0.80	1.00

Mathematical Description of Standardization Procedure

The standardization procedure can be represented mathematically as follows:

Deductible Amount	Operator Age Group		
	Youthful Operator	No Youthful Operator	Combined
$ 50	X_{11}	X_{12}	$X_{1.}$
$100	X_{21}	X_{22}	$X_{2.}$
Combined	$X_{.1}$	$X_{.2}$	$X_{..}$

where,

X_{ij} represents a computed result (either claim frequency or average loss payment, since identical operations are applied to each) for a particular vehicle series,

and

i = 1 for $50 deductible and 2 for $100 deductible,

j = 1 for youthful operator group and 2 for no youthful operator group,

$X_{.j}$ represents the computed results for all deductibles combined,

$X_{i.}$ represents the computed results for both operator age groups combined,

and $X_{..}$ represents the computed results for all deductibles and both age groups combined.

Now, if weights are defined as follows:

Deductible Amount	Operator Age Group		
	Youthful Operator	No Youthful Operator	Combined
$ 50	W_{11}	W_{12}	$W_{11} + W_{12}$
$100	W_{21}	W_{22}	$W_{21} + W_{22}$
Combined	$W_{11} + W_{21}$	$W_{12} + W_{22}$	1

where $$W_{11} + W_{21} + W_{12} + W_{22} = 1$$

then the standardized result, either claim frequency or average loss payment, for the particular vehicle series is:

$$W_{11}X_{11} + W_{21}X_{21} + W_{12}X_{12} + W_{22}X_{22}$$

The standardized average loss payment per insured vehicle year is obtained by multiplying the standardized claim frequency by the standardized average loss payment and dividing by 100.

Similarly, it is possible to standardize within a deductible category or within an operator age group by using the appropriate combined weights. The standardized results for youthful operators, for example, would be:

$$(W_{11} + W_{12})X_{11} + (W_{21} + W_{22})X_{21}$$

and the standardized results for $100 deductible would be:

$$(W_{11} + W_{21})X_{21} + (W_{12} + W_{22})X_{22}$$

These latter standardizations, using the combined weights, enable valid comparisons to be made between the results for different deductible amounts or between the results for different operator age groups without the effects of the other factor biasing the comparisons.

Measure of Agreement in Rankings

The model year collision coverage loss experience results for individual cars were ordered or ranked by assigning rank 1 to the car with the best experience, rank 2 to the car with the next best, and so on. A statistic W called Kendall's coefficient of concordance* can be used to measure the degree of resemblance among rankings for the cars across several model years. W varies from 0 to 1: if there is strong agreement in the rankings, W is close to 1; and if there is little agreement, W is close to 0.

W is computed as follows: Let

$$Q = \frac{12}{MN(N+1)} \sum_{i=1}^{N} R_i^2 - 3M(N+1)$$

*Conover, W.J., *Practical Nonparametric Statistics*, Wiley, New York, 1971.

where

N = number of cars ranked,

M = number of model years for which rankings are determined, and

R_i = sum across the M years of rank for ith car.

Then

$$W = \frac{Q}{M(N-1)}$$

Appendix D

Definitions

Definitions

Average Loss Payment per Claim – The total of all loss payments made for the claims for a group of vehicles, divided by the number of claims paid; expressed as dollars per claim.

Average Loss Payment per Insured Vehicle Year – For a group of vehicles, the product of Claim Frequency and Average Loss Payment per claim, divided by 100; expressed as dollars per insured vehicle year. *It should be noted that this definition differs from the commonly used insurance term, pure premium, but yields similar results.*

Claim Frequency – The number of claims for a group of vehicles, divided by the exposure for that group; expressed as claims per one hundred insured vehicle years.

Collision Coverages – As defined in insurance contracts, the coverage under which people insure their own car against loss caused by collision.

Deductible Amount – That portion of the collision damage cost borne by the policyholder. For collision coverage, the most common deductible amounts are $50 and $100.

Exposure – The time interval an individual vehicle is insured. Exposure for a group of vehicles is expressed in units of insured vehicle years.

Loss Payment – That portion of the collision damage cost borne by the insurer; in general, the total collision damage cost minus the deductible amount.

Operator Age Group – The factor which distinguishes those vehicles whose rated driver is youthful from those vehicles whose rated driver is not youthful (see ***Youthful Operator***).

Rated Driver – The driver who, for insurance purposes, is considered to represent the greatest loss potential for the insured automobile.

Vehicle Identification Number (VIN) – A code, variously comprising both numbers and letters; normally of between 8 and 15 characters in length, assigned to each automobile by its manufacturer. The VIN uniquely identifies the vehicle within at least a ten-year time span and, in recent model year vehicles, almost always contains coding which identifies the make, series, model year, and other characteristics of each vehicle.

Vehicle Series – A name denoting a family of vehicles, within a make, with the same wheelbase and a degree of commonality in construction such as body, chassis, etc.

Vehicle Size Class – A grouping of vehicles based on wheelbase. There are four vehicle size classes defined as follows:

> ***Subcompact*** – Vehicles with wheelbases less than or equal to 101 inches.
>
> ***Compact*** – Vehicles with wheelbases greater than 101 inches and less than or equal to 111 inches.
>
> ***Intermediate*** – Vehicles with wheelbases greater than 111 inches and less than or equal to 120 inches.
>
> ***Full-Size*** – Vehicles with wheelbases greater than 120 inches.

Youthful Operator – For the purposes of this report, all males (married or single) under 25 years of age and all unmarried females under 25 years of age.

List of Publications

Other research reports published by the Highway Loss Data Institute are:

R-72-1 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1972 Models,* June 1973.

R73-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1973 Models Compared with 1972 Models,* September 1973.

R73-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1973 Models,* March 1974.

R73-3 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1973 Models During Their First Two Years,* December 1974.

R73-4 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1973 Models During Their First Three Years,* December 1975.

R74-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1974 Models,* May 1974.

R74-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1974 Models During Their First Year,* December 1974.

R74-3 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1974 Models During Their First Two Years,* December 1975.

R75-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1975 Models,* July 1975.

R75-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1975 Models During Their First Year,* December 1975.

R76-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1976 Models,* June 1976.

R76-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1976 Models During Their First Year, 1975 Models During Their First Two Years, 1974 Models During Their First Three Years,* December 1976.

R77-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1977 Models,* June 1977.

R77-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1977 Models During Their First Year, 1976 Models During Their First Two Years, 1975 Models During Their First Three Years,* December 1977.

R78-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1978 Models,* June 1978.

R78-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1978 Models During Their First Year, 1977 Models During Their First Two Years, 1976 Models During Their First Three Years,* January 1979.

R79-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1979 Models,* June 1979.

V78-1 *Automobile Insurance Losses, Non-Commercial Collision Coverages; Variations by Make and Series, Vans, Pickups, and Utility Vehicles, 1978 Models During Their First Year, 1977 Models During Their First Two Years,* February 1979.

I 75-1 *Automobile Insurance Losses, Injury Coverages; Claim Frequency Results for 1974 and 1975 Models*, June 1976.

I 75-2 *Automobile Insurance Losses, Percentage of Collision Claims with Associated Injury Claims for 1974 and 1975 Models*, March 1977.

I 76-1 *Automobile Insurance Losses, Injury Coverages; Claim Frequency Results for 1974, 1975, and 1976 Models*, November 1977.

I 76-2 *Automobile Insurance Losses, Injury Coverages; Claim Frequency Results for 1974, 1975, and 1976 Models*, September 1978.

I 77-1 *Automobile Insurance Losses, Injury Coverages; Claim Frequency Results for 1977 Models*, September 1978.

A-1 *Automobile Insurance Losses, Collision Coverages; A Comparison of Results for 1972 and 1973 Models*, May 1974.

A-2 *Automobile Insurance Losses, Collision Coverages; Relationships Between Losses and Vehicle Density, 1972 and 1973 Models*, September 1974.

A-3 *Automobile Insurance Losses, Collision Coverages; A Comparison of Results for 1973, 1974 and 1975 Models*, July 1975.

A-4 *Automobile Insurance Losses, Collision Coverages; Relationships Between Losses and Vehicle Density, 1974 and 1975 Models*, December 1975.

A-5 *Automobile Insurance Losses, Collision Coverages; Relationships Between Losses and Vehicle Body Style, 1974 and 1975 Models*, December 1975.

A-6 *Automobile Insurance Losses, Collision Coverages; An Investigation of Relationships Between Losses and Engine Specifications, Using 1973 Models*, June 1976.

A-7 *Automobile Insurance Losses, Collision Coverages; Annual Increases and Seasonal Variations, 1972, 1973, 1974 and 1975 Models*, June 1976.

A-8 *Automobile Insurance Losses, Injury Coverages; A Preliminary Comparison of Results from Volkswagen Rabbits with Passive and Active Seat Belts, 1975 and 1976 Models*, June 1977.

A-9 *Automobile Insurance Losses, Collision Coverages; A Comparison of Collision Claim Size Distributions for 1974, 1975, and 1976 Models*, November 1977.

A-10 *Automobile Insurance Losses, Injury Coverages; Comparisons of the Injury Insurance Claim Experience of Volkswagen Rabbits with Automatic and Manual Seat Belts*, June 1979.

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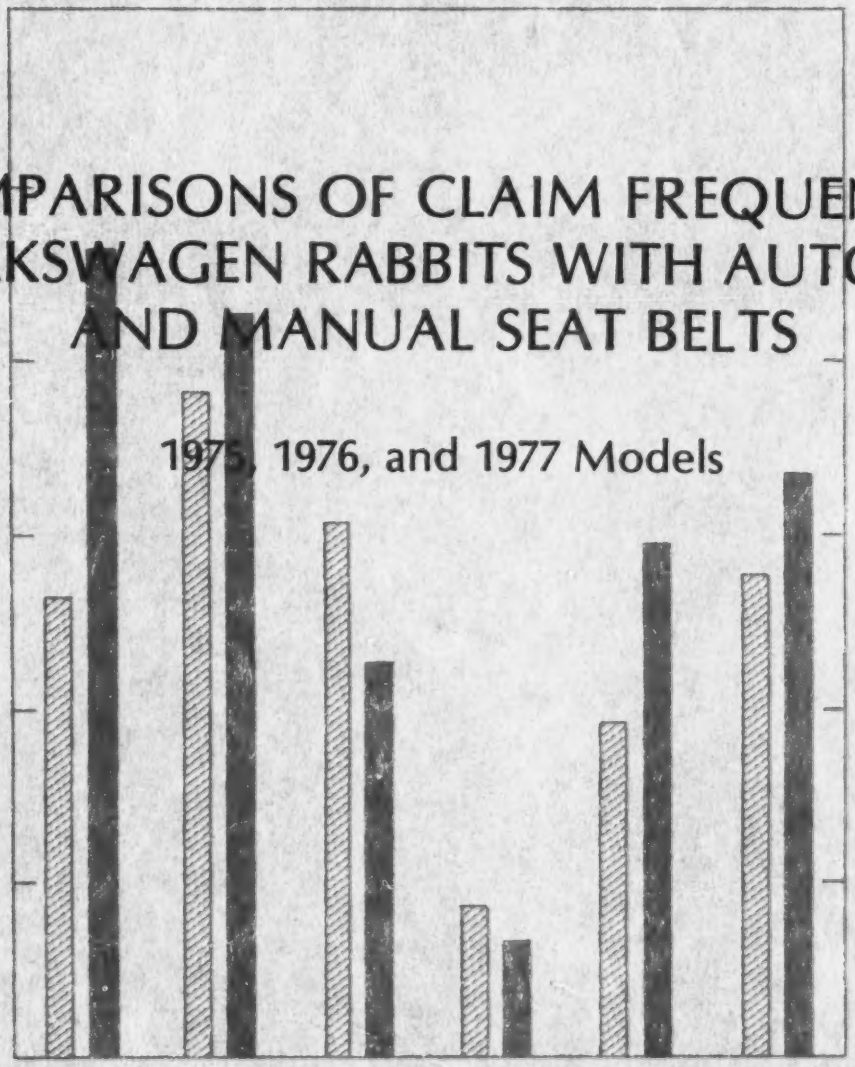
Research Report HLDI A-10
June 1979

Automobile Insurance Losses
Injury Coverages

COMPARISONS OF CLAIM FREQUENCIES OF VOLKSWAGEN RABBITS WITH AUTOMATIC AND MANUAL SEAT BELTS

1975, 1976, and 1977 Models



Highway
Loss
Data
Institute

Watergate 600, Washington, D.C.

Automobile Insurance Losses
Injury Coverages

COMPARISONS OF CLAIM FREQUENCIES OF VOLKSWAGEN RABBITS WITH AUTOMATIC AND MANUAL SEAT BELTS

1975, 1976, and 1977 Models

Research Report HLDI A-10
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Highway Loss Data Institute
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Summary

This Highway Loss Data Institute report updates an earlier, preliminary report which compared the frequencies of insurance claims for injuries to occupants of two groups of Volkswagen (VW) Rabbits – those sold with automatic (so-called "passive") belt systems and those sold with manual belt systems. The results, which are based on considerably more experience than the earlier, preliminary results, are derived from "no fault" personal injury protection and from medical payments insurance experience for three model years – 1975, 1976, and 1977. It is emphasized that the comparisons presented in this report are for injury frequencies *only* and do not address possible differences in injury severities.

Principal Findings:

- Under the personal injury protection ("no-fault") coverages, the VW Rabbits sold with automatic belts had slightly lower overall injury claim frequencies than those sold with manual belts. For the medical payments coverages, which are somewhat more limited, there were no discernible claim frequency differences between the two groups of cars.

- The results of a survey of the claim files indicate that in frontal crashes there were 17 percent fewer injuries to the occupants of VW Rabbits sold with automatic belts, and that the frequency of head injuries was 43 percent lower. In side and other crash types, the frequency of occupant injuries was about equal in the two groups. These results are important, since frontal crashes in general and head injuries in particular cause the majority of motor vehicle occupant deaths.

It is intended that the dissemination of this and other HLDI reports will contribute to research into ways for reducing crash damage to people and property, and also provide the public with information relating to the differences in the crash damage produced by different kinds of vehicles.

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Introduction

The Highway Loss Data Institute (HLDI) is a non-profit, public service organization that gathers, processes, and publishes insurance data concerned with human and economic losses resulting from highway crashes, and especially with the ways such losses vary among different kinds of vehicles.

This report updates an earlier, preliminary report which compared the frequencies of insurance claims for injuries to occupants of two groups of Volkswagen (VW) Rabbits – those sold with automatic ("passive") belt systems and those sold with manual ("active") belt systems.[1] The earlier report was based on injury insurance coverages for 1975 and 1976 models during the calendar period January 1975 through February 1977. This update is based on a longer calendar period – January 1975 through September 1978 – and also includes results for the 1977 model year. In addition to the basic HLDI results, which are based on computerized data, this report also includes results obtained from a survey of the medical information in the injury claim files.

The VW Automatic Belt: Background

Since 1975, an automatic seat belt system has been made available as optional equipment in VW Rabbits. This system is designed to automatically position an upper torso belt around each front seat occupant. In frontal collisions, lower torso restraint is provided by a fixed knee restraint built in below the instrument panel.

Automatic seat belts were available as an option on 1975 model VW Rabbits and were standard equipment in all 1976 and 1977 "deluxe" Rabbit models.[2] Automatic belts require no action by occupants, in contrast to standard three-point manual (active) belts, which do not work unless occupants buckle them each time they enter the car. The purpose of automatic seat belts is to automatically provide crash protection to front seat adult occupants without either the need to invariably remember to buckle the belts, or the inconvenience associated with doing so. As a result, more of the occupants in cars equipped with automatic belts are expected to be restrained in crashes than occupants in cars with manual belts, the observed usage rates of which are extremely low.

The VW Rabbit automatic belts, however, can readily be disconnected. Thus their automatic nature does not ensure 100 percent use. However, use rates are expected to be substantially higher in cars equipped with automatic belts, even with some occupants disconnecting the belts.

The automatic seat belt is one of the alternative design approaches available to and developed by car manufacturers to satisfy the performance criteria of Federal Motor Vehicle Safety Standard (FMVSS) 208.[3] As a standard specifying performance levels in frontal crashes rather than component design, this standard requires that manufacturers choose designs that substantially and automatically limit the potentially injurious forces from frontal and frontal angle crashes that will be allowed to reach front seat occupants, while leaving to vehicle manufacturers the choice of design approaches to be used to achieve this. Whatever approaches are used by manufacturers to meet the requirements of the standard, they must work automatically, i.e., without requiring any action on the part of the occupants, such as buckling or adjusting a manual seat belt. Under a U.S. Department of Transportation order dated June 30, 1977, these

---

[1] "Automobile Insurance Losses, Injury Coverages; A Preliminary Comparison of Results from Volkswagen Rabbit with Passive and Active Belts – 1975 and 1976 Models." Research Report HLDI A-8, June 1977, Highway Loss Data Institute, Washington, D.C.

[2] General Motors has also offered an optional automatic seat belt system on 1978 model Chevrolet Chevettes. Sufficient numbers of these cars with automatic belt designs have not been sold to develop adequate exposure for study. The automatic belt design provided by VW, and that provided by GM to date, are designed to protect adults. Both manufacturers recommend against placing smaller children in seats equipped with them.

[3] 42 *Federal Register* 34289, July 5, 1977.

safety requirements are to be met by all new passenger cars sold in the United States beginning with large cars of the 1982 model year, and will apply to all new cars by the 1984 model year. In addition to automatic belts, the other principal design approach expected to be used by manufacturers to meet the crash force-reducing requirements of FMVSS 208 is the air bag, which automatically provides emergency padding in a crash.

Both automatic belt and air bag equipped cars have been driven for years on U.S. and Canadian roads, and both types of vehicles have been operated for many hundreds of millions of miles. Based on various studies of large numbers of real-world crashes of cars with automatic belts and with air bags, the National Highway Traffic Safety Administration (NHTSA) has concluded that automatic seat belts and air bags are effective in reducing the number of front seat occupant fatalities and serious injuries by about 50 percent.[1]

Insurance Claims Data

This report utilizes a different data source – injury insurance claims – to supplement the other comparisons of the experience of VW Rabbits with automatic belts and those with manual belts. Although automatic seat belts are designed to provide protection primarily in frontal crashes, the results in the present study are based on all crash configurations resulting in injury insurance claims. They are also based on the complete spectrum of insurance claims made for medical treatment resulting from crashes, ranging from claims for reimbursement for precautionary medical examinations undertaken even though no injuries were apparent, at one end of the spectrum, to payments for long-term treatment of serious injuries such as quadriplegia and paraplegia, at the other. However, unlike effectiveness results earlier obtained by NHTSA concerning automatic belts and air bags, and by the Insurance Institute for Highway Safety concerning air bags[2] (all of which showed large reductions in serious injuries), the results reported here are strongly dominated more by frequent claims for minor injuries than by relatively less frequent claims for serious and fatal injuries.[3]

The VW Rabbit automobile is in the subcompact size class, a class which has a much higher than average fatal and serious injury rate. Within this size class, however, there are substantial variations among the different makes and series; the VW Rabbit fairly consistently has had better than average injury insurance experience for subcompact-sized automobiles.[4] Furthermore, the VW Rabbit equipped with manual seat belts has been found in NHTSA studies to have much higher than average belt use, 34 percent compared with 14 percent overall.[5] Therefore, for these and other reasons it is important that the results of this study not be generalized beyond the experience of this single make and series and the specific automatic seat belt design used by its manufacturer.

---

[1] National Highway Traffic Safety Administration. *Occupant Protection Program Progress Report No. 2*. Washington: U.S. Department of Transportation, April 1979.

[2] "Air Bag and Lap/Shoulder Belts – Comparison of Their Effectiveness in Real World Frontal Crashes: Updated September 1977." (Attachment 8 to *Statement of William Haddon, Jr., M.D., et al. Before the House Committee on Interstate and Foreign Commerce, Subcommittee on Consumer Protection and Finance*, September 12, 1977).

[3] All-Industry Research Advisory Committee. *Automobile Injuries and Their Compensation in the United States, Vols. I and II*. Chicago, Illinois: Alliance of American Insurers, March 1979.

[4] "Automobile Insurance Losses, Injury Coverages: Claim Frequency Results for 1974, 1975, and 1976 Models." Research Report HLDI I 76-1, November 1977, Highway Loss Data Institute, Washington, D.C.

"Automobile Insurance Losses, Injury Coverages: Claim Frequency Results for 1977 Models." Research Report HLDI I 77-1, September 1978, Highway Loss Data Institute, Washington, D.C.

[5] Opinion Research Corporation. *Safety Belt Usage: Survey of Cars in the Traffic Population (November 1977–June 1978)*. Prepared for the National Highway Traffic Safety Administration under Contract No. DOT-HS-7-01736. Washington: U.S. Department of Transportation, December 1978.

Two types of first-party injury coverages were used in this report: "no fault" personal injury protection coverages and "medical payments" coverages. Results for these two types of medical coverages, which principally insure against medical losses to occupants of the insured vehicles, are presented separately. Detailed descriptions of these coverages are given in Appendix A.

The data used in this report were supplied by five insurers: Aetna Life and Casualty, Allstate, Liberty Mutual, Nationwide, and State Farm. Appendix B gives a detailed description of the sources and nature of the coverage and claim-related data for both collision and injury coverages.

Analysis

Injury Coverages Included in the Study

Use of personal injury protection and medical payments insurance data to identify crashes involving injury has certain limitations because insurance coverages cannot provide information on all occupant injuries. This occurs when claims for injury costs are not made under these two coverages because of the availability of other sources of medical expense reimbursements, such as the bodily injury liability insurance of third parties, and/or health insurance coverages. Consequently, medical payments and personal injury protection claims reflect only a subset of the crashes involving injury.

The limitations are fewer for personal injury protection coverages than for medical payments coverages. Personal injury protection coverage is provided in so-called no-fault states. Generally, no-fault statutes include some restrictions on the right to claim against others; as a result, the incidence of third party, bodily injury liability claims is much less than in states still operating under the tort system. This means that personal injury protection coverage data more frequently identify injury producing crashes than do medical payments coverage data. Further, personal injury protection coverage typically is written at much higher medical expense limits than medical payments coverage, so that a more complete measure of medical costs should be possible from personal injury protection coverage data. These and other limitations noted below should be kept in mind when examining the reported injury results.

Vehicle Identification

The Vehicle Identification Numbers (VINs) of most new automobiles sold in the United States are individually unique numbers that contain, in coded form, detailed information as to each vehicle's make, series, and other distinguishing characteristics.

The 1975, 1976, and 1977 model year VW Rabbits were identified by their VINs. Using information supplied by Volkswagen of America, Inc., the type of belt system — manual or automatic — sold with each vehicle was determined and in this way the two groups of VW Rabbits were identified.

Exposure

Exposure, in terms of insured vehicle years, was computed for each of the two groups of VW Rabbits from both collision and injury coverage data.

Claim Frequency

Within both the manual and automatic belt equipped groups of Rabbits, all individual vehicles with records of pending or paid claims were identified. Each claim was then matched with its corresponding coverage data to ensure that the crash had occurred within an appropriate period of coverage for that Rabbit. In every instance in which multiple claims were made for the same crash, e.g., when more than one occupant of the car incurred medical expenses, the claims were treated as a single injury claim in the calculation of claim frequency. It should be noted that medical expenses can sometimes be incurred even though the occupants are not injured. This can occur for example when precautionary medical examinations are undertaken even though no injuries are apparent. Other than claims involving non-medical losses only, such as wage loss, and claims settled without payments, all injury claims were used, together with the corresponding exposure, to compute the claim frequency in terms of the number of claims per 1,000 insured vehicle years. Thus, the claim frequencies represent the number of crashes per 1,000 insured vehicle

years in which one or more injuries occurred that resulted in medical expense claim payments under either personal injury protection or medical payments insurance coverages.

Claim Payment Amount

In its reports of the injury claims experience of various kinds of vehicles, HLDI does not yet publish information concerning the costs associated with various injury claims. This is because of the length of time – often several years – that may elapse between the injury occurrence and the final payments for medical expenses, particularly for the more serious injuries in the no-fault states. Stated differently, the longer the injury claims experience for a given set of claims is followed, the larger is the average size of the claims from that set, with years of followup being required for a final answer as to the average claim size.

Results And Discussion

Claim Frequency Results

Table 1 summarizes the claim frequency results for the two groups of VW Rabbits. Under the personal injury protection coverages, the VW Rabbits sold with automatic belts had a slightly lower injury claim frequency than those sold with manual belts. For the medical payments coverages, the claim frequencies for the two groups of cars were virtually identical.

TABLE 1

INJURY INSURANCE CLAIM FREQUENCIES FOR VW RABBITS
SOLD WITH AUTOMATIC AND MANUAL SEAT BELTS – 1975, 1976, AND 1977 MODELS

INJURY COVERAGE	TYPE OF BELTS	TOTAL EXPOSURE (INSURED VEHICLE YEARS)	CLAIM FREQUENCY PER 1,000 INSURED VEHICLE YEARS
Personal Injury Protection	Manual	37,049	18.3
	Automatic	10,681	17.1
Medical Payments	Manual	49,762	11.3
	Automatic	15,669	11.4

Table 2 summarizes the claim frequency results for the two groups of cars by model year. Under the personal injury protection coverages for the 1975 models, the claim frequencies for the two groups of cars were virtually the same; for the 1976 and 1977 models, somewhat lower claim frequencies were found for the VW Rabbits with automatic belts compared to those with manual belts. Under the medical payments coverages, the 1975 and 1977 models with automatic belts had somewhat lower claim frequencies than those with manual belts; for the 1976 models the reverse was the case. The results presented in Table 1 and 2 differ from those in the earlier preliminary results from these two groups of cars, which showed consistent reductions in the injury claim frequencies for the VW Rabbits sold with automatic belts compared with those sold with manual belts.

Insurance loss experience varies substantially in relation to certain non-vehicle factors, and therefore it is useful to investigate the extent to which factors such as operator age varied between the two groups of cars to determine if they might be affecting the comparisons.

Table 3 summarizes the distributions of exposure for the two groups of cars by operator age group. It is apparent from this table that there were only very slight differences in the mix of exposure between the two groups, although under both coverages the cars sold with manual seat belts had slightly higher percentages of youthful operators than those sold with automatic belts.

Table 4 summarizes the claim frequency results by operator age group. The results showed no consistent patterns between the two groups of cars for each operator age group; under the personal injury

TABLE 2

INJURY INSURANCE CLAIM FREQUENCIES FOR VW RABBITS SOLD WITH AUTOMATIC AND MANUAL SEAT BELTS BY MODEL YEAR

INJURY COVERAGE	MODEL YEAR	TYPE OF BELTS	TOTAL EXPOSURE (INSURED VEHICLE YEARS)	CLAIM FREQUENCY PER 1,000 INSURED VEHICLE YEARS
Personal Injury Protection	1975	Manual	8,645	19.3
		Automatic	2,460	19.5
	1976	Manual	8,493	19.5
		Automatic	2,493	17.7
	1977	Manual	19,911	17.3
		Automatic	5,729	15.9
Medical Payments	1975	Manual	21,675	10.7
		Automatic	6,454	9.9
	1976	Manual	14,678	10.5
		Automatic	4,897	12.0
	1977	Manual	13,409	13.3
		Automatic	4,318	13.0

TABLE 3

DISTRIBUTION OF INJURY INSURANCE COVERAGE FOR VW RABBITS BY OPERATOR AGE GROUP

INJURY COVERAGE	TYPE OF BELTS	OPERATOR AGE GROUP*	
		YOUTHFUL	NO YOUTHFUL
Personal Injury Protection	Manual	16%	84%
	Automatic	14%	86%
Medical Payments	Manual	18%	82%
	Automatic	17%	83%

*For the purposes of this report, all males under 25 years of age, and all unmarried females under 25 years of age are classified as youthful operators.

TABLE 4

INJURY INSURANCE CLAIM FREQUENCIES FOR VW RABBITS SOLD WITH AUTOMATIC AND MANUAL SEAT BELTS BY OPERATOR AGE GROUP

INJURY COVERAGE	OPERATOR AGE GROUP	TYPE OF BELTS	TOTAL EXPOSURE (INSURED VEHICLE YEARS)	CLAIM FREQUENCY PER 1,000 INSURED VEHICLE YEARS
Personal Injury Protection	Youthful	Manual	5,805	22.9
		Automatic	1,466	24.6
	No Youthful	Manual	31,244	17.4
		Automatic	9,215	16.0
Medical Payments	Youthful	Manual	8,916	17.0
		Automatic	2,643	15.5
	No Youthful	Manual	40,846	10.1
		Automatic	13,027	10.6

protection coverages, the cars with automatic belts and youthful operators had a higher claim frequency than cars with manual belts and youthful operators, whereas for the medical payments coverages the reverse was true.

The likelihood of an injury claim occurring is strongly related to the severity of the crash, which to an extent is reflected in the size of any collision coverage claim from the crash. Thus, it is also useful to compare the collision coverage experience for the two groups of cars to see whether in this respect the crashes of the manual and automatic belt cars were comparable.

Table 5 shows that the distributions of collision coverage exposure were virtually identical for the two groups of cars for each combination of operator age group and deductible amount – two non-vehicle factors that affect collision coverage loss experience. Table 6 shows that the collision coverage loss experience for the two groups of cars was also virtually identical. (The amounts of exposure for these models under collision coverage is greater than under the injury coverages because data from more states were included.) Table 7 shows that the collision coverage loss payment distributions for the two groups of cars were also virtually identical. Taken together, Tables 5, 6, and 7 indicate that there were no substantial differences in the collision coverage experience of the two groups of cars.

The results presented in Tables 1 through 7 suggest that the two groups of VW Rabbits have no substantial differences in either overall injury frequency or collision insurance experience. These results are in contrast to the preliminary results, based on data from fewer contributing companies, shorter calendar periods, and much smaller amounts of exposure, which suggested that the cars sold with automatic belts had lower injury claim frequencies than those sold with manual belts. The present results, based on considerably more exposure, must be considered more reliable than the earlier, preliminary results.

Limitations of Data

In considering these results it is important to keep in mind some inherent limitations of the data on which they are based. For example, unlike direct observations of occupants of vehicles in use, insurance

TABLE 5

DISTRIBUTION OF COLLISION COVERAGE EXPOSURE BY OPERATOR AGE GROUP AND DEDUCTIBLE AMOUNT FOR VW RABBITS SOLD WITH AUTOMATIC AND MANUAL SEAT BELTS

TYPE OF BELTS	DEDUCTIBLE AMOUNT	OPERATOR AGE GROUP	
		YOUTHFUL	NO YOUTHFUL
Manual*	$ 50	3%	19%
	$100	14%	65%
Automatic	$ 50	3%	20%
	$100	12%	65%

*Does not add to 100% because of rounding.

data cannot provide reliable information on belt use levels. Thus, the extent to which belt use levels differ between the two groups of cars cannot be measured from the present data. Another limitation of insurance claim data for studying restraint systems is that they measure the frequency of one or more injuries occurring to occupants of a crash-involved car regardless of their seating location or of the crash configuration. Thus, some of the claims will be for injured rear seat occupants and some of the crashes will be other than frontal. Since automatic belts in VW Rabbits are designed to offer protection to *front seat* occupants in *frontal* crashes, claims for injuries to rear seat occupants and for other than frontal crashes dilute any differences in claim frequency results between automatic and manual restraints.

Finally, HLDI data at present provide virtually no information on the severities of injuries. Occupant restraint systems such as seat belts (whether manual or automatic) and air bags are designed primarily to protect against the more serious and fatal crash injuries, particularly the serious head and chest injuries which frequently are fatal. It has long been known, for example, that one of the consequences of being restrained by a seat belt in a crash can be bruising and minor injuries caused by the belt itself, but this is a small price to pay for the prevention of the much more serious injuries – especially to the head and neck – that more commonly are sustained by the unrestrained occupant. Thus, minor crash injuries in particular are not expected to be eliminated by occupant restraints.

TABLE 6

SUMMARY OF COLLISION COVERAGE LOSSES FOR VW RABBITS SOLD WITH AUTOMATIC AND MANUAL SEAT BELTS

TYPE OF BELTS	TOTAL EXPOSURE (INSURED VEHICLE YEARS)	CLAIM FREQUENCY PER 100 INSURED VEHICLE YEARS	AVERAGE LOSS PAYMENT PER CLAIM	AVERAGE LOSS PAYMENT PER INSURED VEHICLE YEAR
Manual	88,163	10.4	$792	$82
Automatic	27,358	10.2	$784	$80

TABLE 7

COLLISION COVERAGE LOSS PAYMENT DISTRIBUTION FOR VW RABBITS SOLD WITH AUTOMATIC AND MANUAL SEAT BELTS

COLLISION LOSS PAYMENT LESS THAN OR EQUAL TO	CUMULATIVE PERCENT	
	MANUAL BELT	AUTOMATIC BELT
$ 100	15%	15%
$ 200	30%	30%
$ 300	40%	41%
$ 400	49%	49%
$ 500	55%	56%
$ 600	61%	61%
$ 800	69%	70%
$1,000	75%	76%
$1,500	85%	86%
$2,000	90%	90%
$3,000	94%	94%
$4,000	98%	98%
NUMBER OF CLAIMS	8,782	2,677

In addition, belts basically restrain, and sometimes somewhat bruise, the occupant's torso; the occupant's arms are still free to flail about during a crash. As a result, minor arm injuries (such as bruises) to belted occupants are also not uncommon. Consequently, as has been known scientifically for decades, to expect seat belts, whether manual or automatic, to be effective in preventing all types and all severities of injuries is unrealistic. Seat belts are designed to substantially reduce the severity of crash injuries, particularly the more serious ones; their ability to prevent many of the frequent minor crash injuries is much more limited.

Insurance Claim File Survey

Because of the limitations described above, a special study was undertaken to collect and analyze additional, more detailed data by reviewing many of the individual insurance claim files for the VW Rabbits. The purpose of this survey was to obtain information on the crash configurations and injuries occurring in the two groups of VW Rabbits.

An injury insurance claim file generally contains the information necessary to enable a claims adjuster to settle the claim, and the information on the crashes that generated claims and on the occupants' injuries in those crashes varies tremendously from file to file. Injury descriptions can range from detailed reports from hospitals to brief descriptions produced by non-medical personnel, and, in some instances, to no information whatsoever. Because of the great variability in the quantity and completeness of the available data, no attempts were made to rate the severities of the injuries described.

Claim files also contain variable quality information concerning the seating locations of injured occupants, the types of crash, the crash impact sites, and repair costs. These items are occasionally recorded in detail but often some or all are absent. Since insurers do not directly investigate crashes, much of the information contained in insurance claim files is self-reported by the individuals involved in the crashes. This may limit the utility of much of the data. In addition, many crashes are not investigated by the police and, consequently, relevant information frequently cannot be obtained from that source.

A total of 748 claim files were retrieved from the five insurers whose data were used in this report, and available data on the crash and occupant injuries were extracted and summarized from those files. The claim files studied corresponded to nearly one-half of the 1,604 injury claims involved in the complete study. Table 8 shows the distributions by medical coverages and belt systems for the overall data and the files surveyed. This table indicates that the mix of cars and coverages was virtually identical for the overall data and the subset of files searched manually.

TABLE 8

DISTRIBUTION OF ALL INJURY CLAIMS AND FILES SURVEYED BY BELT SYSTEM AND INJURY INSURANCE COVERAGE

SOURCE OF DATA	TYPE OF BELTS	INJURY COVERAGE	
		PERSONAL INJURY PROTECTION	MEDICAL PAYMENTS
HLDI Injury Claims (1604 Claims)	Manual	42%	35%
	Automatic	12%	11%
Insurance Claim Files (748 Claims)	Manual	41%	36%
	Automatic	12%	11%

Table 9 shows the distributions of injury-producing crashes by crash impact site for VW Rabbits equipped with manual belts and with automatic belts. In each of these crashes, at least one injury claim was reported under either personal injury protection or medical payments coverages. The distributions of impacts for the two groups of cars were similar, but the cars sold with automatic belts had slightly fewer frontal crashes with injury claims (39 percent) than those sold with manual belts (44 percent).

The reported injuries sustained by occupants of the two groups of cars were categorized by body region of injury. The body regions used were: head, face/neck, torso, abdomen/pelvis, arm, leg, general (any body region), and unknown. This categorization is similar to that used in the two widely used crash injury rating systems, the Abbreviated Injury Scale (AIS) and the Injury Severity Score (ISS).[1] Since it is medically very well established that injury mortality increases dramatically the greater the number of serious injuries that have been sustained,[2] injury frequencies were determined from the number of injured body regions. Thus, an occupant with injuries to more than one body region would produce a counted injury for each injured body region; multiple injuries to the same body region were counted only once.

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[1]Joint Committee on Injury Scaling: *The Abbreviated Injury Scale (AIS), 1976 Revision*. Morton Grove, Illinois: American Association for Automotive Medicine, 1976.

[2]Baker, S.P.; O'Neill, B.; Haddon, W., Jr.; and Long, W.B., "The Injury Severity Score: A Method of Describing Patients with Multiple Injuries and Evaluating Emergency Care," *The Journal of Trauma*, Vol. 14, No. 3, March 1974, 187-196.

Baker, S.P., and O'Neill, B., "The Injury Severity Score: An Update," *The Journal of Trauma*, Vol. 16, No. 11, 1976, 882-885.

Bull, J.P., "The Injury Severity Score of Road Traffic Casualties in Relation to Mortality, Time of Death, Hospital Treatment Time and Disability," *Accident Analysis and Prevention*, Vol. 7, No. 4, December 1975, 249-255.

TABLE 9

DISTRIBUTION OF CRASHES BY IMPACT SITE FOR VW RABBITS SOLD WITH AUTOMATIC AND MANUAL SEAT BELTS

CRASH IMPACT SITE	TYPE OF BELTS		TOTAL
	MANUAL	AUTOMATIC	
Front	250 (44%)	68 (39%)	318 (43%)
Side	114 (20%)	30 (17%)	144 (19%)
Rear	106 (19%)	35 (20%)	141 (19%)
Other & Unknown	102 (18%)	43 (24%)	145 (19%)
All Sites	572	176	748

The effectiveness of automatic belts in injury reduction is intended to be greatest in frontal crashes. Among the crashes for which the injury claim files were surveyed, the VW Rabbits sold with manual belts were involved in 250 frontal crashes, as shown in Table 9, and these resulted in 479 injured body regions. On the basis of the injury claims, the VW Rabbits sold with automatic belts were involved in 68 frontal crashes with 108 injured body regions. Table 10 shows the numbers of occupant injuries per 100 crashes with at least one injury claim by vehicle impact site. The cars sold with the manual belt had 192 injured body regions per 100 frontal crashes with at least one injury claim and cars sold with the automatic belt had 159. Thus, between these two groups of cars there was a 17 percent reduction in the number of injured body regions in frontal crashes. In the side and rear impacts, however, the VW Rabbits sold with automatic belts had slightly higher rates of injury than those sold with manual belts, although the differences were very small and not significant. That the automatic belts were not found to be associated with reductions in the injury claim frequencies in side and other non-frontal crash impacts is not surprising. Automatic belts and their knee bolsters, designed primarily to increase occupant crash protection in frontal crashes, cannot, for example, prevent injurious crash intrusions into the passenger compartments that can occur when a vehicle is struck in the side.[1]

Figure 1 shows the rates of occupant injuries to each body region in frontal crashes. The cars sold with automatic belts had lower head, face/neck, arm, and leg injury rates and higher torso and abdomen/pelvis injury rates than the cars sold with manual belts; the differences in the rates of abdomen/pelvis injuries, however, were small. The rate of head injuries was considerably lower (43 percent) in the cars sold with automatic belts.[2]

[1]Passenger compartment intrusion in side impacts can be substantially reduced by manufacturers through some of the practical approaches and lightweight designs demonstrated in the NHTSA Research Safety Vehicle Program.

[2]Among the face/neck injuries, there were indications that the cars with automatic belts had a greater proportion of so-called "whiplash" injuries than cars with manual belts. This is consistent with the finding in an Australian study that cervical whiplash was the *only* injury occurring to any region of the body which was more common among front seat occupants wearing belts compared to unbelted occupants. (McDermott, F., "Control of Road Trauma Epidemic in Australia," *Annals of the Royal College of Surgeons of England*, Vol. 60, No. 6 (November 1978), pp. 437-450).

TABLE 10

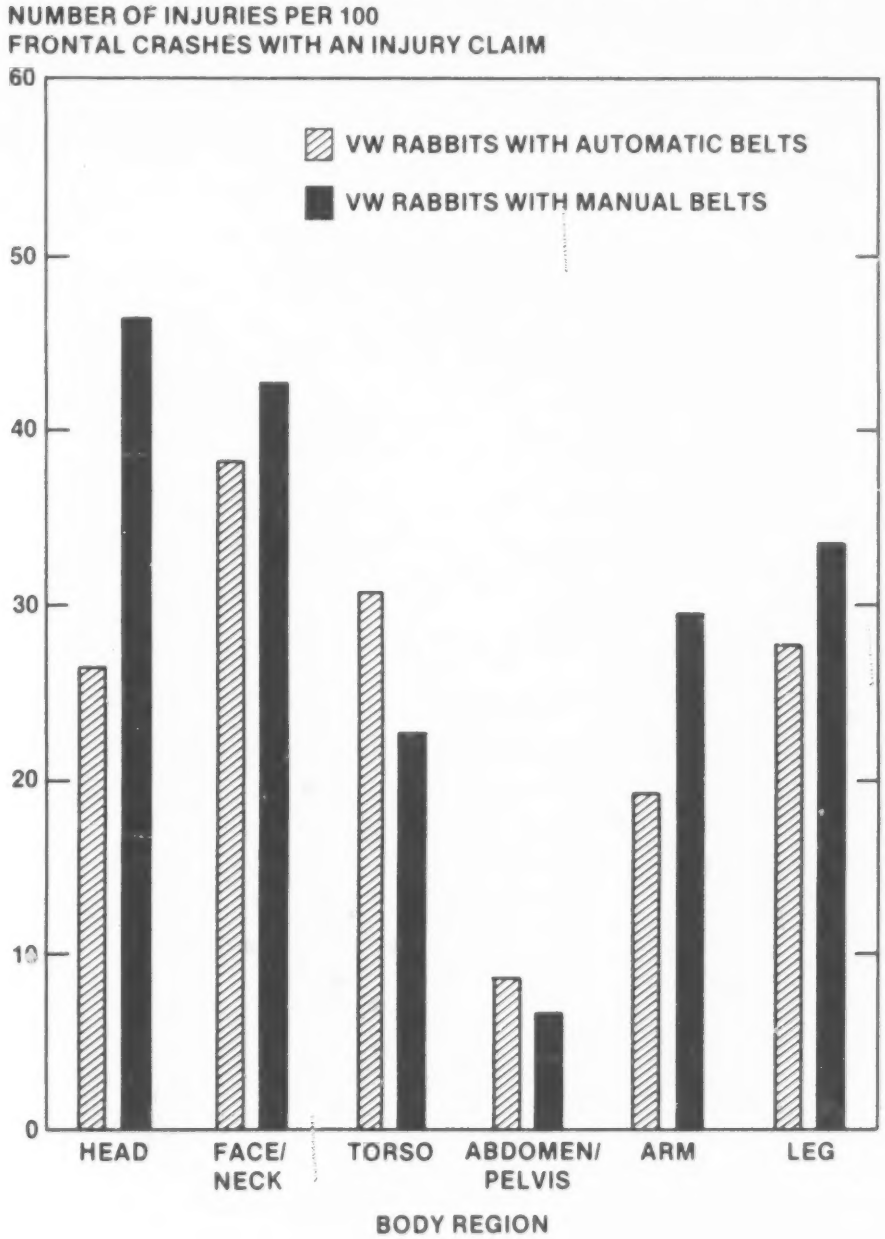
NUMBERS OF INJURED BODY REGIONS PER 100 CRASHES WITH AT LEAST ONE INJURY CLAIM BY CRASH IMPACT SITE FOR VW RABBITS SOLD WITH AUTOMATIC AND MANUAL SEAT BELTS

CRASH IMPACT SITE	TYPE OF BELTS	
	MANUAL	AUTOMATIC
Front	192	159
Side	174	183
Rear	172	180
Other & Unknown	192	181
All Sites	184	173

It must be emphasized that because of the nature of the data, the results of the claim file survey are not definitive. They do, however, suggest that in frontal crashes, fewer injuries to occupants are occurring in the VW Rabbits with automatic belts compared with the same cars with manual belts, and that, in particular, the numbers of head injuries – which have been known scientifically for many decades to be the leading cause of motor vehicle occupant deaths – are being significantly reduced. Since extensive research shows that a majority of all motor vehicle occupant crash deaths are produced by the injurious forces released in frontal collisions,* this is an important, positive result in connection with improving present motor vehicle crash design.

*National Highway Traffic Safety Administration. *Fatal Accident Reporting System (FARS) 1977 Annual Report*. Washington: U.S. Department of Transportation (DOT-HS-803 800), November 1978.

Figure 1
Numbers of injuries in frontal crashes by body region for VW Rabbits sold with automatic and manual seat belts—1975, 1976, and 1977 models



Appendix A

Specifications Of Injury Coverages

Specifications Of Injury Coverages

Medical Payments (Medpay) Coverages

These coverages provide insurance without regard to fault against medical losses for the following persons:

1. The named insured and any member of the household who sustains injury while occupying or through being struck by an automobile.

2. Any other person who sustains injury while occupying:

(a) the insured automobile while being used by the named insured or any other person with the permission of the named insured;

(b) a non-owned automobile while operated by the named insured or member of the household.

Medical payments insurance is frequently sold with small benefit limits; common limits for this coverage are $1,000 or $2,000.

These coverages are not associated with any restrictions on the right of injured persons to seek recovery of losses through tort liability actions.

The medical payments coverages reported in this study were based on data from the 27 states listed in Table A-1.

TABLE A-1
MEDICAL PAYMENTS (MEDPAY) COVERAGES
STATES INCLUDED*

Alabama
Arizona
California
Georgia (through February 1975)
Idaho
Indiana
Iowa
Kentucky (through June 1975)
Louisiana
Maine
Mississippi
Missouri
Montana
Nebraska
New Hampshire
New Mexico
North Carolina
North Dakota (through December 1975)
Ohio
Oklahoma
Pennsylvania (through June 1975)
Rhode Island
Tennessee
Vermont
West Virginia
Wisconsin
Wyoming

*During the period covered by this report, January 1975 through September 1978, no-fault laws became effective in four of the states listed. These states are identified by dates shown in parentheses, which specify in each case the last month for which data for the state were included in this report.

Personal Injury Protection (PIP) Coverages

In "no-fault" states, vehicle owners are required by law to purchase this coverage, which provides first-party insurance against medical and other types of losses. In addition, the law in these states generally places restrictions on the right to bring tort liability actions.

The personal injury protection coverages reported in this study on 1975 and 1976 model year Rabbits were based on data from Florida, New Jersey, and New York; the coverages on 1977 model year Rabbits were based on data from the 20 states listed in Table A-2.

TABLE A-2
PERSONAL INJURY PROTECTION COVERAGES
STATES INCLUDED – 1977 MODEL YEAR VW RABBITS

Colorado	Minnesota
Connecticut	Nevada
Delaware	New Jersey
Florida	New York
Georgia	North Dakota
Hawaii	Oregon
Kansas	Pennsylvania
Kentucky	South Carolina
Maryland	Texas
Michigan	Utah

Appendix B

Sources And Nature Of Data

Sources And Nature Of Data

This report is based on both policy and claim-related injury coverage data for the two groups of VW Rabbits in the calendar period January 1975 through September 1978. These data were supplied by five insurers: Aetna Life & Casualty, Allstate, Liberty Mutual, Nationwide, and State Farm. "Assigned risk," and fleet policies were excluded. Data from Aetna are for 1977 model year VW Rabbits only. Personal injury protection coverage data from New York for 1975 model year VW Rabbits from Allstate are not included in this study.

Insurance Policy Data

Insurance policy data, as distinct from claim data, specify the type of medical coverage and describe the characteristics of the insured vehicle, including its make and series. Policy data used in this report included the following basic information:

- Type of Medical Coverage*
- Vehicle Identification Number (VIN)*
- Rated Driver Characteristics*
- Date and Nature of Relevant Changes in Coverage

Insurance Claim Data

Insurance claim data report the characteristics of the insured vehicle, the initiation of the medical coverage claim and/or the corresponding payment. Claim data used in this report included the following basic information:

- Vehicle Identification Number (VIN)
- Crash Date

*See Appendix C for definitions.

Appendix C

Definitions

Definitions

Claim Frequency – The number of claims for a group of vehicles, divided by the exposure for that group; expressed as claims per units of insured vehicle years.

Collision Coverages – As defined in insurance contracts, the coverage under which people insure their own car against loss caused by collision.

Deductible Amount – That portion of the collision damage cost borne by the policyholder. For collision coverage, the most common deductible amounts are $50 and $100.

Exposure – The time interval an individual vehicle is insured. Exposure for a group of vehicles is expressed in units of insured vehicle years.

First-Party Coverage – An insurance coverage under which the policyholder collects compensation for his losses from his own insurer rather than from the insurer of the person who caused the crash.

Loss Payment (Collision) – That portion of the collision damage cost borne by the insurer; in general, the total collision damage cost minus the deductible amount.

Medical Payments (Medpay) Coverage – First-party coverage against medical losses of the insured, others in his vehicle, and pedestrians struck by him. Medical payments coverage is typically sold with low benefit limits – $1,000 or $2,000 – and involves no restriction on the right of injured persons to make claims against insurers of other vehicles, if they are considered to be at fault in the crash.

No-Fault Auto Insurance – An auto insurance plan in which each driver/owner accepts financial responsibility for some or all losses sustained by himself, pedestrians hit by him, and occupants of his own vehicle in return for which he enjoys immunity from liability for losses to third-party persons. The need to establish fault before reparation is made is eliminated.

Operator Age Group – The factor distinguishing between those vehicles whose rated driver is youthful and those vehicles whose rated driver is not youthful (see ***Youthful Operator***).

Personal Injury Protection (PIP) Coverage – First-party no-fault coverage in which an insurer pays, within the specified limits, the medical, hospital and funeral expenses of the insured, others in his vehicle, and pedestrians struck by him.

Rated Driver – The driver who, for insurance purposes, is considered to represent the greatest loss potential for the insured automobile.

Vehicle Identification Number (VIN) – A code, variously comprising both numbers and letters; normally of between 8 and 15 characters in length, assigned to each automobile by its manufacturer. The VIN uniquely identifies the vehicle within at least a ten-year time span and, in recent model year vehicles, almost always contains coding which identifies the make, series, model year, and other characteristics of each vehicle.

Vehicle Series – A name denoting a family of vehicles within a make, with the same wheelbase and a degree of commonality in construction such as body, chassis, etc.

Youthful Operator – For the purposes of this report, all males (married or single) under 25 years of age and all unmarried females under 25 years of age.

List Of Publications

Other research reports published by the Highway Loss Data Institute are:

R-72-1 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1972 Models,* June 1973.

R73-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1973 Models Compared with 1972 Models,* September 1973.

R73-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1973 Models,* March 1974.

R73-3 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1973 Models During Their First Two Years,* December 1974.

R73-4 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1973 Models During Their First Three Years,* December 1975.

R74-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1974 Models,* May 1974.

R74-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1974 Models During Their First Year,* December 1974.

R74-3 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1974 Models During Their First Two Years,* December 1975.

R75-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1975 Models,* July 1975.

R75-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1975 Models During Their First Year,* December 1975.

R76-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1976 Models,* June 1976.

R76-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1976 Models During Their First Year, 1975 Models During Their First Two Years, 1974 Models During Their First Three Years,* December 1976.

R77-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1977 Models,* June 1977.

R77-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1977 Models During Their First Year, 1976 Models During Their First Two Years, 1975 Models During Their First Three Years,* December 1977.

R78-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1978 Models,* June 1978.

R78-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1978 Models During Their First Year, 1977 Models During Their First Two Years, 1976 Models During Their First Three Years,* January 1979.

R79-1 *Automobile Insurance Losses, Collision Coverages, Initial Results for 1979 Models,* June 1979.

V78-1 *Automobile Insurance Losses, Non-Commercial Collision Coverages, Variations by Make and Series, Vans, Pickups, and Utility Vehicles, 1978 Models During Their First Year, 1977 Models During Their First Two Years,* February 1979.

I 75-1 *Automobile Insurance Losses, Injury Coverages; Claim Frequency Results for 1974 and 1975 Models*, June 1976.

I 75-2 *Automobile Insurance Losses, Percentage of Collision Claims with Associated Injury Claims for 1974 and 1975 Models*, March 1977.

I 76-1 *Automobile Insurance Losses, Injury Coverages; Claim Frequency Results for 1974, 1975, and 1976 Models*, November 1977.

I 76-2 *Automobile Insurance Losses, Injury Coverages; Claim Frequency Results for 1974, 1975, and 1976 Models*, September 1978.

I 77-1 *Automobile Insurance Losses, Injury Coverages; Claim Frequency Results for 1977 Models*, September 1978.

A-1 *Automobile Insurance Losses, Collision Coverages; A Comparison of Results for 1972 and 1973 Models*, May 1974.

A-2 *Automobile Insurance Losses, Collision Coverages; Relationships Between Losses and Vehicle Density, 1972 and 1973 Models*, September 1974.

A-3 *Automobile Insurance Losses, Collision Coverages; A Comparison of Results for 1973, 1974 and 1975 Models*, July 1975.

A-4 *Automobile Insurance Losses, Collision Coverages; Relationships Between Losses and Vehicle Density, 1974 and 1975 Models*, December 1975.

A-5 *Automobile Insurance Losses, Collision Coverages; Relationships Between Losses and Vehicle Body Style, 1974 and 1975 Models*, December 1975.

A-6 *Automobile Insurance Losses, Collision Coverages; An Investigation of Relationships Between Losses and Engine Specifications, Using 1973 Models*, June 1976.

A-7 *Automobile Insurance Losses, Collision Coverages; Annual Increases and Seasonal Variations, 1972, 1973, 1974 and 1975 Models*, June 1976.

A-8 *Automobile Insurance Losses, Injury Coverages; A Preliminary Comparison of Results from Volkswagen Rabbits with Passive and Active Seat Belts, 1975 and 1976 Models*, June 1977.

A-9 *Automobile Insurance Losses, Collision Coverages; A Comparison of Collision Claim Size Distributions for 1974, 1975, and 1976 Models*, November 1977.

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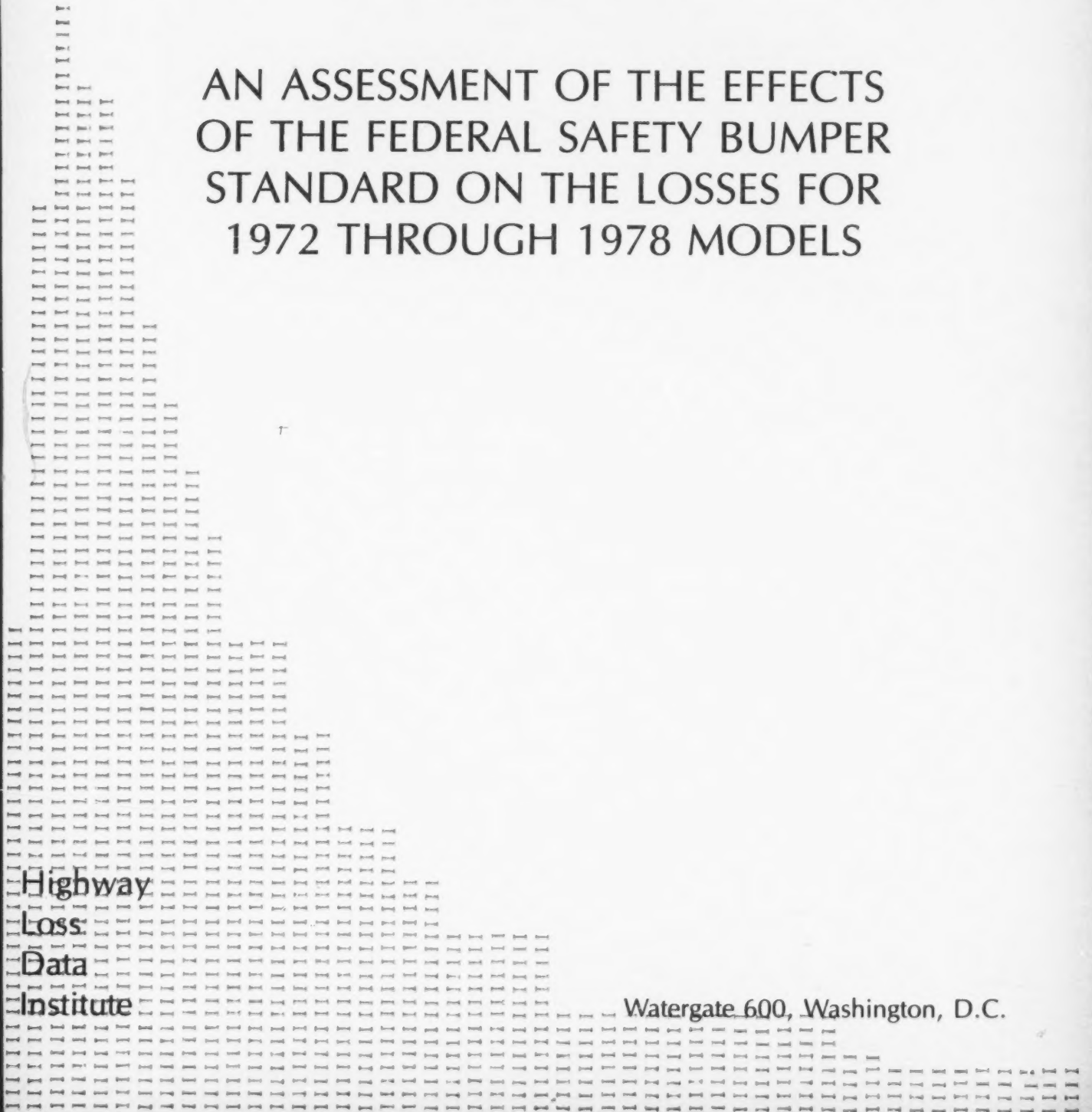
Research Report HLDI A-12
June 1980

Automobile Insurance Losses
Collision Coverages

AN ASSESSMENT OF THE EFFECTS OF THE FEDERAL SAFETY BUMPER STANDARD ON THE LOSSES FOR 1972 THROUGH 1978 MODELS



Highway Loss Data Institute

Watergate 600, Washington, D.C.

Automobile Insurance Losses
Collision Coverages

AN ASSESSMENT OF THE EFFECTS OF THE FEDERAL SAFETY BUMPER STANDARD ON THE LOSSES FOR 1972 THROUGH 1978 MODELS

Research Report HLDI A-12
June 1980

Highway Loss Data Institute
Watergate 600
Washington, DC 20037

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Highway Loss Data Institute

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Summary

This Highway Loss Data Institute report presents comparisons of the collision coverage loss experience – both frequency and size of claims – for 1972 through 1978 model year private passenger cars.

Beginning with the 1973 model year and through the 1978 model year, all new cars sold in the United States had to comply with the requirements of the Department of Transportation's *safety* bumper standard, which was intended to provide protection to safety-related items, such as lights, turn signals, etc., in low speed crashes. Although this was a *safety* bumper standard with *no* restrictions on the costs of low speed crash damage, it was expected that, in addition to the safety benefits, it would result in some reductions in such costs. The comparisons of the loss experience of the 1973 through 1978 models with that of the 1972 models provide estimates of the magnitudes of the reductions in crash damage costs resulting from the federal *safety* bumper standard.

Principal Findings

- The claim frequency results for the model years for which the *safety* bumper standard was in effect were substantially lower than the corresponding results for the pre-standard model year (Tables 1 and 2, page 4).

- When the average loss payment amounts were adjusted for inflation, there were only relatively small differences between the results for the 1973 through 1978 models and those for the 1972 models (Tables 3 and 4, page 6).

- The average loss payments per insured vehicle year were substantially lower for the model years for which the *safety* bumper standard was in effect compared to the corresponding results for the 1972 models (Tables 5 and 6, page 7).

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Introduction

The Highway Loss Data Institute (HLDI) is a nonprofit, public service organization that gathers, processes, and publishes insurance data concerned with human and economic losses associated with motor vehicle use, and, especially, the way such losses vary among different kinds of vehicles.

This report presents comparisons of collision coverage losses – both frequency and size of claims – for 1972 through 1978 model year private passenger cars. The results for each model year are based on the experience of the cars during the first year of their availability, that is, from the September they were introduced through the following September. The report is based on collision coverage and loss data supplied by six insurers: Allstate, Kemper, Liberty Mutual, Nationwide, State Farm and Travelers.

Beginning with the 1973 model year, all new cars sold in the United States were required to comply with the Department of Transportation Federal Motor Vehicle Safety Standard (FMVSS) number 215. This standard specified minimum performance requirements for the reduction of safety-related damage in low speed crashes. For the 1973 models the requirements specified that no damage should occur to safety-related items such as lights, turn signals, etc., in 5 mph front-end and 2.5 mph rear-end test crashes into a barrier. For the later model years the rear-end barrier test speed was increased to 5 mph, and front, rear, and corner pendulum impact tests in which no safety-related damage should occur were also specified (Appendix A details the performance test requirements of FMVSS 215 by model year). Although this standard was *not* a property damage bumper standard, it was expected that, in addition to the safety benefits, it would produce some reductions in property damage costs.

For the 1979 and later model years FMVSS 215 was superseded by the federal *property damage* bumper standard which, for the *first* time, specified minimum requirements for the reduction of property damage in low speed crashes.*

A number of the published HLDI reports have contained results for cars from model years 1972 through 1978, the year immediately prior to and the six years in which the federal *safety* bumper standard applied. Because these various reports were published over a period of years and because the HLDI data base has been improving during the same period, the results from these various reports are not comparable. The purpose of this report is to present results for each of the model years 1972 through 1978 that can be compared.

By comparing the loss experience of the 1973 through 1978 models with that of the 1972 models, it is possible to assess the effects on collision coverage insurance losses of the designs adopted by the various manufacturers to meet the requirements of the federal *safety* bumper standard. It should be noted, however, that it is not possible to definitively state that the observed differences among the model years are entirely due to the federal *safety* bumper standard, since the results for each model year are also for different calendar periods.

It is intended that the dissemination of this and other HLDI reports will contribute to research into ways for reducing highway damage to people and their property, and also provide the public with information relating to the differences in the crash damage produced by different kinds of vehicles.

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*At the time this report was published, congressional action was pending on a bill with an amendment that would limit the federal property damage bumper standard's compliance test speeds to 2.5 mph.

Results and Discussion

Three measures of collision coverage loss experience are summarized for each model year in this report. These are:

- the claim frequencies per 100 insured vehicle years;
- the average loss payment amounts;
- their product divided by 100, which is the average loss payment per insured vehicle year.

Any effect of improved bumpers for the 1973 and later models should show up as reductions in the claim frequencies, rather than reductions in the average loss payment amounts, because improved bumpers should reduce or prevent damage that would otherwise occur in low speed crashes. This would have the effect of eliminating many small claims because even though the low speed impacts were still taking place, the damage from them would either be reduced to zero, or to amounts less than applicable deductibles. In the much less frequent crashes at higher speeds, however, the damage, depending on the bumper designs and materials employed by the vehicle manufacturers, could decrease, increase, or remain the same. The product of claim frequency and average loss payment, the average loss payment per insured vehicle year, is the measure that summarizes the *overall* effect of improved bumpers on collision coverage losses, since it takes into account both the frequency and the size of claims. Thus, it is the most meaningful of the three measures of collision loss experience considered in this report.

Claim Frequency

Table 1 presents adjusted claim frequency results by vehicle *market* class for 1972 through 1978 models (Appendix B provides details on the adjustment procedures). Table 2 shows the differences between these results for each model year in percentage terms compared with the base (pre-*safety* bumper standard) 1972 model year. These results show substantial decreases in the claim frequency results for model years for which the *safety* bumper standard was in force, compared with the pre-standard model year of 1972.

The 1973 model year claim frequency results were *from seven to 15 percent lower* than the corresponding 1972 model year results.*

The 1974 model year claim frequency results were *from 16 to 28 percent lower* than the corresponding 1972 model year results. (The gasoline shortages that occurred in 1974 were probably responsible for some of the reductions in the 1974 model year claim frequency results.)

The 1975 model year claim frequency results were *from seven to 24 percent lower* than the corresponding results for the 1972 models.

The 1976 model year claim frequency results were *from 15 to 28 percent lower* than the corresponding results for the 1972 models.

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*The 1973 models were the first models required to meet the performance requirements of the *safety* bumper standard FMVSS 215, prohibiting damage to safety-related components such as lights, turn signals, etc., in 5 mph front-end and 2.5 mph rear-end barrier crash tests. The rear-end barrier crash test speed was increased to 5 mph for the 1974 and later model years (Appendix A).

TABLE 1

ADJUSTED HLDI COLLISION COVERAGE CLAIM FREQUENCIES PER 100 INSURED VEHICLE YEARS BY VEHICLE MARKET CLASS

1972 THROUGH 1978 MODELS DURING THEIR FIRST YEAR OF AVAILABILITY

MARKET CLASS	MODEL YEAR						
	1972	1973	1974	1975	1976	1977	1978
Subcompact	12.9	12.0	9.3	9.8	9.5	9.9	10.7
Compact	11.7	10.1	8.4	8.9	8.4	8.6	9.6
Intermediate	12.4	10.5	9.3	10.0	9.6	8.7	8.9
Full-Size	10.1	9.0	8.5	9.4	8.6	9.7	10.2

TABLE 2

PERCENTAGE DIFFERENCES BETWEEN 1972 AND 1973 THROUGH 1978 MODEL YEAR CLAIM FREQUENCY RESULTS BY VEHICLE MARKET CLASS

MARKET CLASS	MODEL YEAR					
	1973	1974	1975	1976	1977	1978
Subcompact	− 7	− 28	− 24	− 26	− 23	− 17
Compact	− 14	− 28	− 24	− 28	− 26	− 18
Intermediate	− 15	− 25	− 19	− 23	− 30	− 28
Full-Size	− 11	− 16	− 7	− 15	− 4	+ 1

The claim frequency results for the 1977 models ranged *from four to 30 percent below* the claim frequency results for the corresponding 1972 models.*

For the 1978 models, the claim frequency results were *from one percent higher to 28 percent lower* than the results for the corresponding 1972 models.

The results shown in Table 2 convincingly show that, with the exception of the 1977 and 1978 model full-size cars, the 1973 through 1978 models had substantially lower claim frequency results than the corresponding 1972 models – *despite the fact that no adjustments for inflation were made to the claim frequency results.*

Average Loss Payments

Table 3 shows HLDI collision coverage average loss payment results for 1972 through 1978 market classes adjusted in the same manner as the claim frequency results, and inflated to 1978 dollars using the consumer price index for car maintenance and repair.** Table 4 shows the percentage differences between the 1972 model year results and the corresponding 1973 through 1978 model year results.

The differences *ranged from an eight percent reduction to a 12 percent increase.* For most market classes and model years, the differences were small. The increases for the subcompact market class for 1975 and later models probably reflect the fact that parts price increases began to rise substantially faster for small cars beginning in the middle of calendar year 1974, following the removal of price controls.

Average Loss Payments Per Insured Vehicle Year

The products of frequency of claims (Table 1) and average loss payments per claim (Table 3) divided by 100 are average loss payments per insured vehicle year. Table 5 shows the average loss payments per insured vehicle year in 1978 dollars by vehicle market class for 1972 through 1978 models. Table 6 shows the percentage differences between the 1972 model year average loss payment per insured vehicle year results and the corresponding 1973 through 1978 model year results. *In every market class, for each model year, with the exception of the full-size 1977 and 1978 models, there were substantial reductions compared to the corresponding 1972 model year results.****

For the 1973 models, the first cars required to meet FMVSS 215, *the reductions ranged from four percent to 17 percent.*

For the 1974 models *the reductions ranged from 21 to 35 percent.*

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*It should be noted that in the 1977 model year, General Motors (GM) entered the first phase of its major downsizing program and virtually all of its formerly full-size cars – cars that generated well over half of the full-size market class exposure in prior model years – were downsized to the intermediate market class. This group of GM cars in prior model years had better loss experience than the remainder of the full-size market class. This shift in car mix thus would account for the smaller reduction in the claim frequency results for the 1977 and 1978 full-size market class compared with the corresponding reductions for the 1976 models.

**This inflation adjustment underestimates the rate of inflation for crash damage repair costs because, for 1976 and earlier years, it did not include bodywork repairs, which were increasing in cost at a more rapid rate than other automobile repairs. Thus the results presented here are conservative estimates because the effect of inflation is understated.

***The market class with only a one percent reduction was the full-size class, and in the 1977 model year virtually all of the formerly full-sized GM models were downsized to the intermediate class.

TABLE 3

ADJUSTED HLDI COLLISION COVERAGE AVERAGE LOSS PAYMENTS PER CLAIM IN 1978 DOLLARS* BY VEHICLE MARKET CLASS

1972 THROUGH 1978 MODELS DURING THEIR FIRST YEAR OF AVAILABILITY

MARKET CLASS	MODEL YEAR						
	1972	1973	1974	1975	1976	1977	1978
Subcompact	$748	$776	$761	$841	$766	$814	$829
Compact	785	757	720	769	738	733	814
Intermediate	758	774	727	732	737	755	794
Full-Size	715	762	672	706	673	734	735

*Based on the consumer price index for car maintenance and repair.

TABLE 4

PERCENTAGE DIFFERENCES BETWEEN 1972 AND 1973 THROUGH 1978 MODEL YEAR AVERAGE LOSS PAYMENT RESULTS BY VEHICLE MARKET CLASS

MARKET CLASS	MODEL YEAR					
	1973	1974	1975	1976	1977	1978
Subcompact	+ 4	+ 2	+ 12	+ 2	+ 9	+ 11
Compact	− 4	− 8	− 2	− 6	− 7	+ 4
Intermediate	+ 2	− 4	− 3	− 3	0	+ 5
Full-Size	+ 7	− 6	− 1	− 6	+ 3	+ 3

TABLE 5

ADJUSTED HLDI COLLISION COVERAGE AVERAGE LOSS PAYMENTS PER INSURED VEHICLE YEAR IN 1978 DOLLARS* BY VEHICLE MARKET CLASS

1972 THROUGH 1978 MODELS DURING THEIR FIRST YEAR OF AVAILABILITY

MARKET CLASS	MODEL YEAR						
	1972	1973	1974	1975	1976	1977	1978
Subcompact	$97	$93	$71	$82	$73	$81	$89
Compact	92	76	60	68	62	63	78
Intermediate	94	81	68	73	71	66	71
Full-Size	72	69	57	66	58	71	75

*Based on the consumer price index for car maintenance and repair.

TABLE 6

PERCENTAGE DIFFERENCES BETWEEN 1972 AND 1973 THROUGH 1978 MODEL YEAR AVERAGE LOSS PAYMENT PER INSURED VEHICLE YEAR RESULTS BY VEHICLE MARKET CLASS

MARKET CLASS	MODEL YEAR					
	1973	1974	1975	1976	1977	1978
Subcompact	− 4	− 27	− 15	− 25	− 16	− 8
Compact	− 17	− 35	− 26	− 33	− 32	− 15
Intermediate	− 14	− 28	− 22	− 24	− 30	− 24
Full-Size	− 4	− 21	− 8	− 19	− 1	+ 4

For the 1975 models *the reductions ranged from eight to 26 percent.*

For the 1976 models *the reductions ranged from 19 to 33 percent.*

For the 1977 models *the reductions ranged from one to 32 percent.*

For the 1978 models *the differences ranged from a four percent increase for the full-size models to a 24 percent decrease* for the intermediate market class.

The preceding findings utilize published HLDI results to provide the most valid comparisons possible across the 1972 through 1978 model years. It is clear that the collision coverage loss experience of the 1973 through 1978 models was substantially better than that of the corresponding 1972 models. Furthermore, the improvements were less for the 1973 models, which had to meet much less stringent requirements under FMVSS 215, than for the later model years.

The evidence presented here strongly supports the conclusion that the federal *safety* bumper standard has reduced collision coverage insurance losses. Precisely what share of the improvements can be ascribed specifically to the standard cannot be determined, since the results for each model year are also for different calendar periods. Nor can differences in the effectiveness of the various design alternatives chosen by auto manufacturers in response to the standard's performance requirement be ascertained.

Since FMVSS 215 was *not* a property damage reduction standard, but a standard addressing *only* damage to safety-related items, the mistake should not be made of assuming that the economic benefits from it are a measure of the savings that can be expected from an adequate property damage standard. The best that can be said of economic benefits resulting from FMVSS 215 is that, beneficial as they appear to have been, they are less than the savings to be expected from an effective *property damage* bumper standard.

Appendix A

Federal Motor Vehicle Safety Standard 215
Impact Test Requirements by Model Year

TABLE A

FEDERAL MOTOR VEHICLE SAFETY STANDARD 215
IMPACT TEST REQUIREMENTS BY MODEL YEAR

MODEL YEAR	IMPACT TEST REQUIREMENTS	
	BARRIER	PENDULUM
1973	5 mph Front 2.5 mph Rear	None None
1974	5 mph Front 5 mph Rear	5 mph Front — 6 impacts 5 mph Rear — 6 impacts 3 mph Corner at 20" Front — 1 impact 3 mph Corner at 20" Rear — 1 impact The pendulum test requirements did not apply to cars with wheelbases of 115" or less that have either convertible tops, or no roof supports between the A-pillar and the rear roof support structure, or no rear designated seating positions.
1975	5 mph Front 5 mph Rear	5 mph Front — 6 impacts* 5 mph Rear — 6 impacts* 3 mph Corner at 20" Front — 1 impact 3 mph Corner at 20" Rear — 1 impact *Reduced to 2 impacts for cars manufactured after May 12, 1975.
1976	5 mph Front 5 mph Rear	5 mph Front — 2 impacts 5 mph Rear — 2 impacts 3 mph Corner Front at 20" and 16" — 2 impacts 3 mph Corner Rear at 20" and 16" — 2 impacts The corner impacts at 16" did not apply to cars with wheelbases greater than 120".
1977 and 1978	5 mph Front 5 mph Rear	5 mph Front — 2 impacts 5 mph Rear — 2 impacts 3 mph Corner Front at 20" and 16" — 2 impacts 3 mph Corner Rear at 20" and 16" — 2 impacts

Appendix B

Data Sources and Adjustments

Data Sources and Adjustments

The results presented in this report were taken from five HLDI reports that were published between May 1974 and January 1979. Each summarized the collision loss experience of passenger cars of one or more model years. During this period a number of improvements were made to the HLDI data base and these changes have made comparisons across the model years of the results as published invalid.

In order to make valid comparisons across the seven model years, a number of adjustments must be made to account for the improvements made to the HLDI data base. In particular, three principal changes, which substantially affected the results, must be accounted for. These are:

1. ***Changes in the numbers of insurers supplying data to HLDI.*** For the 1972 models, HLDI was receiving data from only three insurers, whereas for all of the later model years data were supplied by at least six insurers. The three insurers that supplied 1972 model year data were Kemper, Nationwide, and State Farm, and beginning with the 1973 models, Allstate, Liberty Mutual, and Travelers began supplying data to HLDI. Because of differences among companies, in particular the greater urban concentration of Allstate policy holders, the effect of adding the additional data suppliers was to *increase* claim frequency and *decrease* average loss payments results for the model years subsequent to 1972.

2. ***Changes in the way HLDI classified cars.*** In 1977, HLDI switched from summarizing results by vehicle *market* class to vehicle *size* class. Prior to 1977 HLDI had used the traditional market class definitions that were then widely used in the automobile industry. In the mid-1970's, however, the traditional market class definitions were being discarded, and the assignment of vehicles to particular market classes was increasingly arbitrary. Before 1977, HLDI results were summarized for four major market classes – subcompact, compact, intermediate, and full-size – to which vehicles were assigned by wheelbase, and for four minor market classes – sports, specialty, expensive specialty, and luxury – to which vehicles were assigned subjectively. In the mid-1970's, a number of car models were introduced which did not easily fit into any of the traditional market class definitions and new market terms such as "precision size" were introduced by manufacturers. Further, with the beginning of the major General Motors (GM) down-sizing program, a number of cars that were formerly full-size were reduced in dimensions so that in terms of their size they were intermediates, but they were marketed by GM as full-size models.

In order to avoid the increasingly subjective nature of assigning cars to *market* classes, in 1977 HLDI adopted a vehicle *size* classification system based *entirely* on the wheelbases of the cars. All HLDI results published since 1977 have been summarized for four *size* classes – subcompact, compact, intermediate, and full-size – and these results include the loss experience of cars that for earlier model years were included in the sports, specialty, expensive specialty, and luxury market class results. This change resulted in substantially *higher* claim frequency and average loss payment results for the *size* classes that had the same names as the earlier *market* classes.

3. ***Increases in the numbers of car makes handled by HLDI.*** The vehicle specific information in the HLDI data are derived by decoding the vehicle identification numbers (VINs) of individual cars. For all domestic cars and many imports this decoding is relatively straightforward because the necessary information is directly encoded within the VINs; for a number of import car makes, however, and in particular, for some of the leading Japanese imports, certain key information such as the model year of the car cannot be obtained by direct decoding of the VIN. For these makes, model year information can only be obtained indirectly by reference to the numbers of cars produced in each model year and also the individual production number for each car. In 1978, HLDI significantly expanded the number of car makes for which it pub-

lishes results when it upgraded its capability to obtain model year information from the VINs of a number of imports for which direct decoding was not possible. Two of the makes included as a result of this change were the leading Japanese imports, Toyota and Datsun, and data from these car makes have contributed to HLDI results published since 1978. Because many of these imports – in particular Toyota and Datsun – have a worse loss experience than most of the cars in their size classes, this change resulted in higher claim frequencies and average loss payments in the results published since 1978, primarily in the subcompact size class.

The effects of the changes in data suppliers, vehicle class definitions, and vehicle makes included in the HLDI data base can be illustrated by comparisons of the results from a number of the published reports.

Tables B-1 and B-2 summarize published claim frequency results for model years 1972 through 1978 (the report number from which each set of results was obtained is shown in parentheses under each model year heading). In these tables, two sets of results are shown for four of the model years – 1973, 1975, 1976, and 1977. The differences between each set illustrate the effects of the improvements in the HLDI data system.

1. The two sets of claim frequency results for the 1973 models in Table B-1 show the effect of increasing the number of data supplying companies. The second set of 1973 model year results in Table B-1 (from Report R73-4) were based on data from six insurers, including Allstate, whereas the first set of results (from Report A-1) were based on data from three insurers only. As the differences between the two sets of 1973 model year results show, increasing the number of data supplying companies produced higher claim frequency results for each of the market classes; for the 1973 models the increases ranged from seven percent for the compacts to 11 percent for the full-size models.

2. Market class results for the 1975 and 1976 models are shown in Table B-1, and size class results for the same model year in Table B-2. The differences between the two sets of results for each model year illustrate the effect of the switch from reporting results for each model year by market class to size class. The 1975 and 1976 model year *size* class results in Table B-2, which included the loss experience of sports, specialty, and luxury models, were between five and 21 percent higher than corresponding *market* class results for the same model years in Table B-1.

3. The two sets of results for the 1977 models in Table B-2 illustrate the effect of including data from the major Japanese imports – Datsun and Toyota. The first set of 1977 model results was computed during 1977 before data from these major imports were included. The second set was computed in 1978, when the HLDI system had been expanded to include data from these cars. The addition of data from the import models in the second set of 1977 model year results produced a 12 percent increase in the claim frequency for the subcompact size class.

The Adjustments

The results shown in Table 1 of this report were obtained by adjusting the results in Tables B-1 and B-2. To make the market class claim frequency results comparable to those from the later model years, the 1972 model year results shown in Table B-1 were adjusted by amounts equal to the percent differences between the two sets of 1973 model year results. For example, for the subcompact market class, the 1972 model year claim frequency of 11.8 from Table B-1 was multiplied by 12.0 (the 1973 model claim frequency result obtained using data from six insurers), and divided by 11.0 (the 1973 model year result obtained using data from only three insurers), producing the value of 12.9 shown in Table 1 of this report. Corresponding adjustments were made to the 1972 model year results from the other market classes.

TABLE B-1

HLDI COLLISION COVERAGE CLAIM FREQUENCIES PER 100 INSURED VEHICLE YEARS BY *MARKET* CLASS

1972 THROUGH 1976 MODELS DURING THEIR FIRST YEAR OF AVAILABILITY

MARKET CLASS	MODEL YEAR					
	1972	1973		1974	1975	1976
	(A-1)*	(A-1)*	(R73-4)**	(R76-2)**	(R76-2)**	(R76-2)**
Subcompact	11.8	11.0	12.0	9.3	9.8	9.5
Compact	10.9	9.4	10.1	8.4	8.9	8.4
Intermediate	11.3	9.6	10.5	9.3	10.0	9.6
Full-Size	9.1	8.1	9.0	8.5	9.4	8.6

*Data supplied by 3 insurers.
**Data supplied by 6 insurers.

TABLE B-2

HLDI COLLISION COVERAGE CLAIM FREQUENCIES PER 100 INSURED VEHICLE YEARS BY *SIZE* CLASS

1975 THROUGH 1978 MODELS DURING THEIR FIRST YEAR OF AVAILABILITY

SIZE CLASS	MODEL YEAR				
	1975	1976	1977		1978
	(R77-2)*	(R78-2)*	(R77-2)*	(R78-2)**	(R78-2)**
Subcompact	10.6	10.5	10.4	11.6	11.9
Compact	9.9	10.2	9.9	10.3	10.8
Intermediate	10.6	10.1	9.4	9.8	9.6
Full-Size	10.2	9.7	10.2	10.6	10.9

*Data from major Japanese imports not included.
**Data from major Japanese imports included.

1977 and 1978 model year results by *market* class were obtained by eliminating the loss experience of the sports, specialty, and luxury models, and makes not previously included from the 1977 and 1978 model year *size* class results shown in Table B-2.

The car types and individual series whose loss experience was eliminated from the 1977 and 1978 model year results published in R77-2 and R78-2, respectively, are shown in Table B-3.

No adjustments were made to account for the effects of inflation on the claim frequency results across the years, since it is not possible to quantify this effect. However, as automobile repair costs increase through inflation, more of the crash damage will exceed the collision coverage deductible amounts and therefore increase the claim frequency results.

Tables B-4 and B-5 show the average loss payment results corresponding to the claim frequency results in Tables B-1 and B-2. The effects of the changes in data sources, vehicle class definitions and vehicle makes included on the average loss payment results can be seen from these tables.

The results shown in Table 3 in this report were obtained by adjusting the results in Tables B-4 and B-5. The 1972 through 1978 model year average loss payment results were first adjusted in the same manner as the claim frequency results and then inflated to 1978 dollars using the consumer price index for car maintenance and repair.

TABLE B-3

INDIVIDUAL VEHICLE SERIES AND BODY STYLE SUBGROUPS WHOSE LOSS EXPERIENCE WAS ELIMINATED FROM THE VEHICLE SIZE CLASS RESULTS PUBLISHED IN R77-2 AND R78-2

R77-2	R78-2
1977 MODELS	**1978 MODELS**
Buick Skyhawk	Toyota Corona
Oldsmobile Starfire	Subaru DL
Ford Mustang II	Mazda GLC
Chevrolet Monza	Datsun B210
Volkswagen Scirocco	Ford Mustang II
	Toyota Corolla
All sports models	Chevrolet Monza
	Oldsmobile Starfire
All specialty models	Buick Skyhawk
	Datsun 200SX
	Toyota Celica
	Volkswagen Scirocco
	All sports models
	All specialty models

TABLE B-4

HLDI COLLISION COVERAGE AVERAGE LOSS PAYMENTS PER CLAIM BY *MARKET* CLASS

1972 THROUGH 1976 MODELS DURING THEIR FIRST YEAR OF AVAILABILITY

MARKET CLASS	MODEL YEAR					
	1972	1973		1974	1975	1976
	(A-1)*	(A-1)*	(R73-4)**	(R76-2)**	(R76-2)**	(R76-2)**
Subcompact	$484	$528	$500	$541	$673	$659
Compact	504	511	488	512	616	635
Intermediate	494	531	499	517	586	634
Full-Size	470	527	491	478	565	579

*Data supplied by 3 insurers.
**Data supplied by 6 insurers.

TABLE B-5

HLDI COLLISION COVERAGE AVERAGE LOSS PAYMENTS PER CLAIM BY *SIZE* CLASS

1975 THROUGH 1978 MODELS DURING THEIR FIRST YEAR OF AVAILABILITY

SIZE CLASS	MODEL YEAR				
	1975	1976	1977		1978
	(R77-2)*	(R78-2)*	(R77-2)*	R78-2)**	(R78-2)**
Subcompact	$745	$727	$829	$850	$897
Compact	615	659	717	740	847
Intermediate	605	659	722	733	824
Full-Size	588	631	753	792	834

*Data from major Japanese imports not included.
**Data from major Japanese imports included.

List of Publications

Other research reports published by the Highway Loss Data Institute are:

R72-1 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1972 Models,* June 1973.

R73-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1973 Models Compared with 1972 Models,* September 1973.

R73-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1973 Models,* March 1974.

R73-3 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1973 Models During Their First Two Years,* December 1974.

R73-4 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1973 Models During Their First Three Years,* December 1975.

R74-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1974 Models,* May 1974.

R74-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1974 Models During Their First Year,* December 1974.

R74-3 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1974 Models During Their First Two Years,* December 1975.

R75-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1975 Models,* July 1975.

R75-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1975 Models During Their First Year,* December 1975.

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